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Rev. 07/10/02

Comprehensive VOC Investigation Report

The Lockformer Company
Lisle, Illinois

Volume 1 of 6: Section 1.0 and Section 2.0

Clayton Project No. 15-65263.01.008
May 10, 2002

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SECTION 1

1.0 EXECUTIVE SUMMARY

1.1 OBJECTIVES OF THE SITE INVESTIGATION

The objective of site investigations, to date, on The Lockformer Company (Lockformer) site has been to determine the extent of contamination in soil and groundwater by constituents of concern attributable to the site.

1.2 TECHNICAL APPROACH TO MEET OBJECTIVES

The technical approach to meeting the objectives of the site investigation has included the following:

1. Developed the May 25, 2001 *Comprehensive VOC Investigation Work Plan* (Investigation Work Plan) that was approved by the Illinois Environmental Protection Agency (IEPA) on June 28, 2001 with comments.

2. Issued Addendum #1 on July 16, 2001 to the approved Investigation Work Plan addressing IEPA's comments.

3. Performed the scope of work identified by the Investigation Work Plan.

4. Performed additional investigations necessitated by findings associated with the original scope of work identified in the Investigation Work Plan.

5. Participated in numerous meetings and discussions with representatives of the IEPA, the Illinois Attorney General's (IAG's) office, and the United State Environmental Protection Agency (USEPA) to discuss remedial measures, cleanup objectives and additional investigations for the Lockformer site.

6. Production of this report per the directive of the IEPA dated February 20, 2002.

1.3 STATEMENT OF RECOGNIZED ENVIRONMENTAL CONDITIONS

Known, suspected, and potential sources of contamination at the Lockformer site are generally identified here. Detailed discussions regarding the nature of the known, suspected, or potential sources of contamination and the migration pathways from them are discussed in other portions of this report. The following is a listing of these sources.

- Delivery spills at the former TCE fill pipe and tank area.
- Releases in the former vapor degreaser area.
- Releases from the sanitary sewer system.
- Releases to the existing and former drainage ways.

1.4 DATA LIMITATIONS

As of the date of submittal, there are no known or suspected data that are included in this report that are erroneous or are misrepresentations. Data quality assurance and quality control issues are discussed in Section 5 of this report. The only known data limitations relate to investigation data gaps. The sufficiency of investigation data is discussed in Section 8.1.

SECTION 2

2.0 SITE CHARACTERIZATION

2.1 PREVIOUS STUDIES

Investigations regarding TCE releases on the Lockformer site began in 1991 after contaminated soil was encountered along the west side of the Lockformer building during the repair of the fire system water line. At that time, STS Consultants (STS) of Northbrook, Illinois was hired to investigate the nature and extent of the releases.

The following reports were prepared by STS from their investigations at the Lockformer site:

- *Draft Preliminary Exploration of TCE Release*, June 10, 1992
- *Remedial Investigation at the Lockformer Company*, May 25, 1995
- *Additional Assessment of TCE Release*, February 14, 1997
- *Phase II Environmental Site Assessment*, March 4, 1997
- *Draft Focused Site Investigation/Remediation Objectives Report*, February 24, 1998

In 1998, Lockformer hired Carlson Environmental, Inc. (CEI) to lead investigations related to the IEPA Site Remediation Program (SRP) work at the site.

The following reports and/or information were prepared by CEI and were submitted to the IEPA SRP in connection with the TCE release and investigations at the Lockformer site:

- *IEPA SRP DRM-1 and DRM-2 Forms and Shallow Soil and Ground Water Sampling Plan*, August 5, 1998.

- *Revised Proposal for Additional Task 2 Sampling Investigation Plan*, January 22, 1999.

- *Draft Investigation Results*, March 15, 1999.

- *Off-Site Piezometer Installation and Ground Water Flow Direction Results*, September 30, 1999. (This report was forwarded to IEPA on October 19, 1999.)

- *Additional Actions Required to Obtain an NFR Letter*, October 15, 1999.

- *Residential Well Sampling Results*, October 19, 1999.

Clayton Group Services, Inc. (Clayton) was hired by Lockformer in December 2000 in relation to an injunctive hearing that involved litigation. Clayton has issued the following reports and work plans related to the investigations at the Lockformer site:

- *Interim Investigation Report, The Lockformer Company, Lisle, Illinois, dated January 25, 2001.*

- *Comprehensive VOC Investigation Work Plan, The Lockformer Company, Lisle, Illinois, dated February 2, 2001.*

- *Comprehensive VOC Investigation Work Plan, The Lockformer Company, Lisle, Illinois, dated March 26, 2001. (Revision of 2/2/01 submittal).*

- *Comprehensive VOC Investigation Work Plan, The Lockformer Company, Lisle, Illinois, dated May 25, 2001. (Revision of 3/26/01 submittal).*

- *Addendum #1 to the May 25, 2001 Comprehensive VOC Investigation Work Plan, dated July 16, 2001.*

- *Removal Action Work Plan, The Lockformer Company, Lisle, Illinois, dated August 14, 2001.*

- *Removal Action Work Plan, The Lockformer Company, Lisle, Illinois, dated December 13, 2001. (Revision of 8/14/01 submittal).*

- *Lockformer Work Plan, The Lockformer Company, Lisle, Illinois, dated April 12, 2001. (Revision of 12/13/01 submittal).*

2.2 CHRONOLOGICAL SUMMARY OF HISTORIC USES OF SITE

The Lockformer property was farmland with a single-family farmhouse on it until 1968 when construction was initiated for the Lockformer facility building. The construction of the Lockformer facility building was completed, and the facility was opened for business in March 1969. The Lockformer property has undergone little modification since 1969.

The MetCoil parcel of property was farmed until some time between 1981 and 1986. At this time, permission was granted to have fill material soils, which were generated from the widening of Ogden Avenue, placed on the property. As part of the fill placement on the property, a storm water retention basin was constructed at the south end of the property. Since the time of filling, the MetCoil parcel of property has remained vacant.

2.3 EXISTING CONDITIONS

At the time of issuance of this report, the implementation of remedial measures outlined for Areas 1 and 2 are anticipated to begin in short order. These remedial measures are the result of a Unilateral Administrative Order (UAO) on consent between Lockformer and the United States Environmental Protection Agency (USEPA). Representatives from the Illinois Environmental Protection Agency (IEPA) and the Illinois Attorney General's (IAG's) office participated in the discussions that resulted in the definition of the scope of work related to remedial activities taking place under the UAO. The remedial activities at the site will address the remediation of the constituents of concern in soil and groundwater for some portions of the Lockformer site. The constituents of concern for the site are defined as any volatile organic compounds (VOCs) determined to be present in media samples analyzed, and are attributable to the Lockformer site. The constituents of concern for the site are defined as the following:

- tetrachloroethene (PCE)
- trichloroethene (TCE)
- cis-1,2-dichloroethene (cis-1,2-DCE)
- trans-1,2-dichloroethene (trans-1,2-DCE)
- 1,1-dichloroethene (1,1-DCE)
- 1,1,1-trichloroethane (TCA)
- 1,1,2-trichloroethane (1,1,2-TCA)
- 1,1-dichloroethane (1,1-DCA)

- 1,2-dichloroethane (1,2-DCA)
- vinyl chloride (VC)

2.4 SITE DESCRIPTION

The Lockformer site is located at 711 W. Ogden Avenue in Lisle, Illinois. Figure 2.4-1 is a site location map based on United States Geological Survey (USGS) 7.5 Minute Series Topographic Map, Wheaton, 1993. The Lockformer site is split into two parcels. Through time, the east parcel has typically been referred to as the Lockformer site, and the west parcel has typically been referred to as the MetCoil property. Recently, to aid in designations involving the investigations, the Lockformer site has been identified as Area 1, and the MetCoil Property has been divided into the northern half (Area 2) and the southern half (Area 3). Figure 2.4-2 identifies the areas on the Lockformer site that have been designated Areas 1, 2, and 3. Area 1 is located in the east ½ of the southeast ¼ of the southeast ¼ of the southwest ¼ of Section 2, Township 38 North, Range 10, East of the Third Principal Meridian, DuPage County, Illinois. The majority of the northern 2/3 of Area 2 is located within the west ½ of the southeast ¼ of the southeast ¼ of the southwest ¼ of Section 2. The majority of the southern portions of Areas 2 and 3 are located within the western ½ of the northeast ¼ of the northwest ¼ of Section 11, Township 38 North, Range 10 East, Third Principal Meridian, DuPage County, Illinois. The site is located in a mixed industrial / residential area on the south side of Ogden Avenue, approximately 1,300 to 2,300 feet west of Interstate 355.

Area 1 has been developed by construction of an office/manufacturing building. The Lockformer manufacturing building is a rectangular-shaped office/manufacturing structure that has been utilized for the manufacture of sheet metal processing equipment and roll forming machines since March 1969. The facility building comprises approximately 88,000 square feet of area. The facility building is constructed of masonry and metal truss atop a concrete slab foundation. A partial basement is located under the office portion of the building. A grassy landscaped area is located at the northernmost portion of the property, adjacent to Ogden Avenue. Asphalt parking lots are located at the north and west ends of the building. An asphalt drive and dock area are located at the northeastern portion of the property. A covered water reservoir for back-up sprinkler purposes and an onsite potable water well used in the manufacturing processes (non-contact cooling water) are located off the northeastern corner of the office building.

An open area currently exists at the rear of the facility building. From approximately summer of 2000 until fall of 2001, a large soil pile existed in this area. This soil pile was placed on the Lockformer site by excavators digging the storm water retention basin for the Bill Kay auto dealership, directly south of the Lockformer property. As a good neighbor, Lockformer allowed the use of its property for temporary storage of this soil. Per an agreement with USEPA and IEPA officials, the soil pile was sampled on a grid pattern and at depth to determine if it contained any hazardous constituents from the Lockformer site. After laboratory analyses showed the soils composing the soil pile were clean, the Bill Kay auto dealership made the appropriate arrangements to dispose of the soil pile in an offsite landfill. The soil pile was removed from the site in the fall of 2001.

The MetCoil parcel, which comprises Areas 2 and 3, contains approximately 11.3 acres of undeveloped land and is located immediately west of the Lockformer parcel (Figure 2.4-2). The majority of Areas 2 and 3 have had a significant amount of soil fill placed on them. The nature of this fill is discussed more thoroughly in Section 2.4.5. Aerial photography and investigations for Areas 2 and 3 indicate that only the southern half of Area 3 has not been extensively filled. A storm water retention basin is constructed in this portion of the site. Aerial photographic coverage for the site indicates that the retention basin construction and the filling that took place on Areas 2 and 3 were performed some time between March 1981 and March 1986.

2.4.1 Site Base and Plat Maps

A base map of the Lockformer site is provided in Figure 2.4.1-1. The Lockformer site and the surrounding area up to 2,000 feet away are depicted on this figure at a scale of one-inch equals 200 feet. All parcel property lines within the base map area have been identified to the extent possible. All data appearing on this base map were provided by DuPage County with the exception of the Section, Township, and Range information, which was developed by the Illinois State Geological Survey (ISGS).

A plat of survey for the Lockformer parcel (Area 1) is provided in Figure 2.4.1-2. A plat of survey for the MetCoil parcel (Areas 2 and 3) is provided in Figure 2.4.1-3. These figures provide the legal description for the parcels and the parcel boundaries.

2.4.2 Surrounding Land Use

Ogden Avenue and a residential subdivision are located north of the Lockformer property, and the Bill Kay auto dealership is located directly east of the Lockformer facility building. A storm water retention basin (owned by the Bill Kay auto dealership to control runoff from its property) is located south of the Area 1 Lockformer parcel. Elm Street runs north-to-south, just south of the Bill Kay storm water retention basin. Chicago Street runs east-to-west at the north end of Elm Street on the south side of the retention basin. A series of single-family homes and one apartment building exist along Chicago and Elm Streets. The homes on the west side of Elm Street are adjacent to the southern portion of the MetCoil parcel. Several of these homes are serviced by wells. The homes just to the south and southeast of the Lockformer building, which obtain their water from private wells at their residences, are identified in Figure 2.4.2-1.

The Burlington Northern railroad right-of-way borders the southern edge of Area 3. An unincorporated subdivision of homes exists south of the Burlington Northern Railroad.

This unincorporated subdivision is bounded by Front Street on the north, Gamble Drive on the south, Westview Lane on the east, and Kingston Avenue on the west. For the remainder of this report, this subdivision will be referred to as the Front Street subdivision. Many of the homes in the Front Street subdivision have private wells. Village of Lisle water and sewer mains have been distributed throughout the Front Street subdivision. However, at the time of distribution, many homes chose not to be connected to the municipal water supply.

St. Joseph Creek is a prominent feature in the local topography that exists on the north side of the Front Street subdivision between the homes, and the Burlington Northern right-of-way and the Lockformer site. The headwaters for St. Joseph Creek start to the east of downtown Downers Grove, flow to the west through downtown Downers Grove and the Ellsworth Industrial District, and continue to the west along the northern edge of the Front Street subdivision. At the northwest corner of the Front Street subdivision, the creek flows to the north through a culvert under the Burlington Northern right-of-way. St. Joseph Creek then flows to the northwest toward the East Branch of the DuPage River.

Areas 1 and 2 on the MetCoil parcel are bounded on the west by the Ogden Corporate Center property (formerly known as Northern Builders). The Ogden Corporate Center property has been developed and comprises multi-unit commercial and professional buildings, a parking lot, and a storm water retention basin at its south end. Ogden Corporate Center is, in turn, bordered on the west by the U.S. Postal facility and St. Joseph Creek.

2.4.3 Potential Sources of Contamination

Known, suspected, and potential sources of contamination at the Lockformer site (or from other locations that could contribute contaminants of concern to the Lockformer site or offsite areas) are generally identified here. Detailed discussions regarding the nature of the known, suspected, or potential sources of contamination and the migration pathways from them are discussed in other portions of this report. The following is a listing of these sources. Figures are provided to identify these known, suspected, or potential source locations.

Lockformer Site

- Delivery spills at the former TCE fill pipe and tank area.
- Releases in the former vapor degreaser area.
- Releases from the sanitary sewer system.
- Releases to the existing and former drainage ways.

Figure 2.4.3-1 identifies the known, suspected, or potential sources of contamination at the Lockformer site.

Offsite Locations

- Releases from Ellsworth Industrial District.
- Releases due to dumping into St. Joseph Creek.
- Releases from the Lisle sanitary sewer system.
- Releases from dry cleaning operations in the area.

Figure 2.4.3-2 identifies the known, suspected, or potential sources of contamination that could be impacting offsite areas in the vicinity of the Lockformer site. Figure 2.4.3-3 provides the layout of the Lisle sanitary sewer system, which was obtained from the Lisle Village Hall.

2.4.4 Onsite/Offsite Withdrawal Wells

In the vicinity of the Lockformer site, current and historic well usage to supply domestic and public distributed water supplies is significant. The overwhelming majority of this well water withdrawal has been from the Silurian dolomite aquifer. A significant amount of information is available regarding historic usage in the area. This information is contained in municipal, IEPA, Illinois State Water Survey (ISWS), industry, and private files pertaining to these water supply wells. The information presented in this section related to current and historic water well withdrawal in the vicinity of the Lockformer site is not intended to be an exhaustive analysis of the subject. It is, instead, a compilation of the pertinent facts regarding the current and historic well usage in the area, and the resultant impacts that these withdrawals have made on groundwater flow in the Silurian dolomite in the vicinity of the Lockformer site over time. In addition to the documents referenced in Section 2.1, the following documents and reviews have been performed in preparing the information contained in this section:

- IEPA Division of Public Water Supplies file on the Village of Lisle, obtained through Freedom of Information Act (FOIA) request.
- IEPA Division of Public Water Supplies file on the Village of Downers Grove, obtained through FOIA request.
- Lisle Facility Number 0430551 Well Site Survey Report. January 1990. Division of Public Water Supplies. IEPA/PWS/89-377.
- Citizens DuPage Utilities Division Facility Number 0430552 Well Site Survey Report. August 1989. Division of Public Water Supplies. IEPA/PWS/89-243.
- Downers Grove Facility Number 0430300 Well Site Survey Report. April 1989. Division of Public Water Supplies. IEPA/PWS/89-075.
- Belmont-Highwood PWD Facility Number 0435180 Well Site Survey Report. June 1992. Division of Public Water Supplies. IEPA/PWS/92-074.
- Maple Hill Improvement Association Facility Number 0435800 Well Site Survey Report. June 1992. Division of Public Water Supplies. IEPA/PWS/92-077.

Currently, a large number of potable water wells exist in the Lisle and Downers Grove area. The majority of these wells serve individual residential homes. Figure 2.4.4-1 identifies the areas in Lisle and Downers Grove where a large number of residences are served by potable water wells. Although well logs are only available for some of the wells in these areas, it is likely the majority of the wells in each area are completed in the Silurian dolomite aquifer.

Large portions of the areas identified in Figure 2.4.4-1 also have access to publicly distributed water. As a result, it is difficult to determine the exact number and distribution of individual homes utilizing water wells. The IEPA has been sampling residential well water in these communities since the fall of 2000, and is currently the best source of information on the usage of well water on a house-by-house basis in the Lisle and Downers Grove areas.

Historically, the Villages of Lisle and Downers Grove (and some unincorporated communities around the Lockformer facility) were served by public or private water supply districts that distributed water obtained from water wells completed in the Silurian dolomite aquifer. In April 1992, the DuPage Water Commission began purchasing water from Lake Michigan and distributing it to the Villages of Lisle and Downers Grove. At this time, most water wells that previously provided water for Lisle and Downers Grove were placed on standby status. Some wells were subsequently sealed and abandoned. Table 2.4.4-1 identifies most of the wells in the vicinity of the Lockformer site that, historically, have had a significant impact on the groundwater hydrology in the area.

To demonstrate the impacts of the historic groundwater withdrawal from the Silurian dolomite aquifer prior to the DuPage Water Commission distributing Lake Michigan water to the area, a series of figures have been created. Figure 2.4.4-2 represents the potentiometric surface of the Silurian dolomite in 1960 in the vicinity of the Lockformer site. The figure was developed by superimposing the potentiometric surface for 1960 (Figure 52) from the Cooperative Report (Zeizel et al. 1962) on the image of DuPage County, and rectifying the mutual coordinates. The outline of the Lockformer site is depicted in Figure 2.4.4-2 for perspective. The 1960 potentiometric surface map indicates that groundwater in the vicinity of the Lockformer site flows to the west toward the large cone of depression in downtown Lisle developed around former Village of Lisle Well #1.

Studies performed by the ISWS resulted in two other historic potentiometric surface maps for DuPage County (Sasman et al. 1981). Figures 2.4.4-3 and 2.4.4-4 present the potentiometric surface maps for 1966 and 1979, respectively, developed from these studies. Again, the original potentiometric surface maps developed by the ISWS have been superimposed onto the image of DuPage County, and mutual coordinates have been rectified. The outline of the Lockformer site has been placed on each figure for reference. A review of Figures 2.4.4-3 and 2.4.4-4 indicates that the Silurian dolomite aquifer groundwater flow in 1966 and in 1979 in the vicinity of the Lockformer site was to the west-southwest toward the pumping center in downtown Lisle.

At this juncture, it is appropriate to comment on the accuracy and history behind the development of the potentiometric surface maps for 1960, 1966, and 1979 developed by the ISWS and the ISGS. The first issue that should be discussed regarding the generation of these potentiometric surface maps is their accuracy. To evaluate the accuracy of these maps, a review of a few pertinent facts is in order. The facts regarding the accuracy of these figures as they were originally developed are as follows:

- The work taking place at the ISWS and ISGS in the late 1950s and throughout the 1960s involved some of the most advanced research, data collection, analysis, and reporting of its time. The list of achievements in the field of hydrology, hydrogeology, and environmental study is too lengthy to discuss here. However, it is fair to say that the research and publications generated by the ISWS and ISGS on these subjects were unsurpassed by any institution in existence.

- Several authors involved in the 1962 and the 1981 studies are some of the most respected geohydrologists of their time. Two of the authors, Thomas A. Prickett and William C. Walton, published a great deal of research from this time that is still taught in most graduate-level hydrogeology classes. An example is the analysis of the groundwater withdrawal from pumping centers and the steady-state equilibrium they reach with respect to precipitation recharge first published in the 1962 Cooperative Report (Zeizel et al.) publication in question. This analysis by Walton is still taught at the university level, and one of the primary reasons for developing the potentiometric surface maps in the 1962 report was to perform this analysis. It should be expected that the accuracy of these maps was not taken lightly by the authors.

- Mr. Prickett also described Ground Water Development in Several Areas of Northeastern Illinois in his 1964 work portrayed in his Water Survey Report of Investigation 47. In particular, further research on the Silurian dolomite Aquifer was conducted by Prickett in the area at and to the east of Downers Grove. Numerous recharge rates were further described in northeastern Illinois, and voluminous tables of aquifer properties of the Silurian dolomite were given in that report.

- The senior author of the 1979 report, Robert T. Sasman, also co-authored the 1962 report. Mr. Sasman spent a great deal of the time during his approximate 35 years of employment with the ISWS doing research on the Silurian dolomite aquifer in DuPage County. Mr. Sasman's involvement in both the 1962 and 1981 work products provides the necessary consistency and quality assurance between the two projects that resulted in the publications.

- Peer review employed at the ISWS and ISGS for work undergoing publication was rigorous. It essentially involved a multiple-stage review by committees organized within both the ISWS and ISGS, review by the editorial staff, and finally review by the Chief of both Surveys. In addition, Art Zeizel was performing this work for his Ph.D. dissertation at the University of Illinois Geology Department. As a result, all work was peer reviewed by the University of Illinois Geology Department faculty and subject to the defense process.

The facts regarding the accuracy of superimposing the ISWS potentiometric surface maps on current aerial photography should not be considered a source of inaccuracy for the following reasons:

- Scans of the ISWS maps were made at a high resolution, 600 dpi.

- The geographic coordinates have been rectified and match well. This includes township and range lines, major roads, and surface water bodies (East Branch of the DuPage River and St. Joseph Creek). The procedures employed utilized care to register the image features to these real-world features using an ortho-rectified aerial photomap base of DuPage County with a resolution of 6 inches to the pixel.

- The rectification process entailed adjusting the scanned image to their aerial photo base for the entirety of DuPage County, not just the Lockformer area.

- The match between known well points on the scanned images to the actual real-world locations exceed the horizontal accuracy standard identified in the United States National Map Accuracy Standards developed by the U.S. Bureau of the Budget.

- The location of wells used to collect static water level data for the area is or was (in the case of wells that have been abandoned) well known. The location of these wells on the 1960 potentiometric surface map to the known locations on the aerial photographs result in a good match.

- The identification, location, pumping history, and changes to usage of production wells during the period of study covered by the potentiometric surface maps are well known. The public water supply wells that created the large cones of depression observed on the 1960, 1966, and 1979 maps were the same wells that operated throughout the time period from 1960 through April 1992 when they were put on standby. They were the Lisle #1 well on Burlington Avenue, the two Citizens Utility wells south of the Front Street subdivision along Kingston Avenue and Primrose Avenue, and the Downers Grove well #10 on Katrine Avenue.

Generally speaking, potentiometric maps are always labor-intensive in their creation because of the effort involved in acquiring the static water levels from wells over a large area that are all surveyed to a known datum. After that task has been performed, potentiometric surface maps are relatively simple to create and interpret, because groundwater always moves from high potentiometric head to low potentiometric head. This flow can clearly and easily be discerned on each map in question.

Given the above facts, it seems intellectually curious that anyone would doubt the accuracy of the ISWS and ISGS potentiometric surface maps. Simply being old is not reason to doubt the maps' accuracy. Very seldom are potentiometric surface maps developed by a group of individuals with as much experience as the maps presented here. In the case of the 1960 potentiometric surface map, great care was given to its development because it was used for one of the classic analyses in hydrogeologic study – an analysis that has stood the test of time. Few other reports are subjected to as rigorous a peer review process as that performed in the process of publishing these reports. In the final analysis, it must be concluded that these maps reflect the nature of the groundwater flow at the time the studies were conducted.

As to the relevance of these potentiometric surface maps, that will be discussed at greater length in Section 6.0.

The 1981 ISWS report was the last to contain a potentiometric surface map of the Silurian dolomite for DuPage County developed by the ISWS or any government agency. However, beginning in 1985, the ISWS began requiring municipal water supplies to report water level measurements from their production wells. Clayton reviewed the ISWS files pertaining to the water supplies in the area and determined that, in December 1985, the wells appearing in Table 2.4.4-2 were all independently measured and reported to the ISWS. These data were plotted and contoured to indicate the groundwater flow in the Silurian dolomite in the vicinity of the Lockformer site, and are presented in Figure 2.4.4-5. This potentiometric surface map utilizes water level measurements from some of the same wells in the vicinity of the Lockformer site used by the ISWS in 1960 to develop Figure 2.4.4-2. A review of the data collected from December 1985 indicates that the groundwater flow in the Silurian dolomite in the vicinity of the Lockformer site was to the west, and was similar to previous years of measurement in 1960, 1966, and 1979.

2.4.5 Facility Construction

The general facility layout, including the description of site buildings and paved areas, was discussed in Section 2.4. The plat maps, included in Figures 2.4.1-2 and 2.4.1-3, also identify these areas and include the locations of easements and right-of-ways. Three aboveground storage tanks (ASTs) previously existed at the site. Two of these tanks were mounted on the roof of the Lockformer building. One of the roof-mounted tanks was the 500-gallon TCE tank where delivery spills occurred. This tank was used from the time the facility began operation in March 1969 until it was removed from service in June 1999. Once the roof-mounted TCE tank was removed, it was replaced by a double-walled, secondarily contained 250-gallon TCE tank inside the Lockformer building. This tank was used from June 1999 until February 2001 when Lockformer discontinued the use of TCE at the facility. The 250-gallon tank still exists at the facility. Figure 2.4-2 indicates the location of the former 500-gallon TCE tank on the roof.

A third AST, which stored ammonia for use in the heat-treating process, was located on top of the Lockformer facility building immediately south of the TCE tank. This tank was used from March 1969 until sometime in late 1989 or early 1990 when ammonia was no longer used in the heat-treating process.

There have been no underground storage tanks (USTs) installed or determined to have been present on the Lockformer property. All piping that serviced the ASTs was run above grade and inside the building, with the exception of the fill and vent pipes on the former 500-gallon TCE tank and former ammonia tank mounted on the roof. The fill and vent pipes for these tanks were located along the west side of the building.

The utilities at the Lockformer facility are illustrated in Figure 2.4.5-1.

2.4.6 Topography

Clayton obtained (from DuPage County) and reviewed a topographical survey for the vicinity of the site. The topographical information for the site is illustrated in Figure 2.4.6-1. In general, the site's west parcel is higher in elevation than the east parcel. However, both parcels slope to the south/southwest. The eastern portion of the east parcel slopes east. A low-lying (ditch) right-of-way is located between the east and west parcels. Elevations on the east parcel range from approximately 714 feet above mean sea level (msl) adjacent to Ogden Avenue to approximately 700 feet above msl at the most southwestern portion of the parcel. Elevations on the west parcel range from approximately 714 feet above msl adjacent to Ogden Avenue to approximately 674 feet above msl at the southern portion of the parcel.

A drainage swale runs north to south between Areas 1 and 2, and along the east side of Area 3. Prior to approximately 1983, this drainage swale contained a headwall at approximately the boundary between Areas 2 and 3, where storm water collected from Area 1 was discharged to the swale. The swale then ran to the south along the east side of Area 3 to ultimately discharge into an east-west drainage feature at the very southern end of Area 3, immediately north of the railroad tracks. In approximately 1983, the headwall in this drainage swale was taken out of service, and a new storm sewer line was installed east of the drainage swale in the Village of Lisle right-of-way. This storm sewer line runs to the south, down the West Avenue right-of-way, to an east-west storm sewer line that crosses the south end of Area 3. At approximately the time the headwall was removed, a retention basin was installed on the southern end of the MetCoil property in Area 3 to collect surface water runoff from the MetCoil property.

2.4.7 Area Geology

The Lockformer site is located within the Wheaton Morainal section of the Great Lakes physiographic province. The uppermost surficial glacial unit present at the Lockformer site comprises undifferentiated Valparaiso Moraine deposits (Willman 1971). The Valparaiso Moraine includes a buried drift of questionable age, informally called the Lemont Drift, which consists of yellow-gray silty till, sand and gravel, and dune sand. These morainal deposits are generally overlain by a thin Richland Loess or modern soil (Zeizel et al. 1962).

The Mackinaw Member of the Henry Formation appears to have been deposited along the course of St. Joseph Creek throughout the area in the vicinity of the Lockformer site

(Willman 1971). The Mackinaw Member is comprised of unconsolidated, well-sorted sand and gravel, and appears to be deposited as a valley train associated with St. Joseph Creek. The thickness of the alluvium is variable and may directly overlie the dolomitic bedrock.

The Paleozoic bedrock underlying the glacial deposits comprises about 3,500 feet of lithified, stratified, sedimentary rocks of Cambrian, Ordovician, and Silurian ages. The formations dip gradually to the east and southeast at about 10 feet per mile and are folded into a series of gentle anticlines and synclines. The glacial deposits at the subject property rest upon a synclinal fold of bedrock.

The Silurian dolomite in the vicinity of the Lockformer site is grouped into two primary series of rock – the Niagaran and the Alexandrian. The Niagaran Series overlies the Alexandrian Series. The Alexandrian Series is composed of dolomite that decreases in clastic content from its base upward. Shale and highly argillaceous dolomite beds occur near the base and grade to a relatively pure dolomite near the top (Zeizel et al. 1962). In the vicinity of the Lockformer site, the Alexandrian Series appears to be approximately 50 feet thick and occurs from approximately 440 to 490 feet msl (Zeizel et al. 1962).

In the vicinity of the Lockformer site, the Niagaran Series is composed of three formations – the Racine, Waukesha, and Joliet. These formations range from clean dolomite to highly silty, argillaceous, and cherty dolomite. Reefs and associated strata are more common at the top of the Series but may occur as low as the Joliet Formation (Zeizel et al. 1962). The lower beds of the Joliet Formation are characterized by their pink or red color and distinct lithology (more argillaceous) and are easily recognizable.

The structure of the Silurian dolomite in DuPage County has been studied through observation in the numerous rock quarries throughout the region. These studies indicate two major systems of joints occur in the area and trend approximately N 50° E and N 47° W (Zeizel et al. 1962).

2.4.7.1 Site Geology

Since investigative activities began at the Lockformer site in 1992, a series of subsurface investigations have been conducted to evaluate the extent of volatile organic compound (VOC) contamination. The investigations have included the advancement of approximately 181 soil borings to facilitate the collection of approximate 422 discrete soil samples, and the installation of 63 monitoring wells to facilitate the collection of groundwater samples for chemical analysis. A large number of these soil borings and groundwater monitoring wells have been installed in Areas 1 and 2 to define the geology and the extent of contamination there. The boring logs generated from investigations at the Lockformer site are provided in Appendix 9.4.

Based on subsurface investigations conducted in Areas 1 and 2, the lithologies in the vicinity of the former TCE fill pipe are comprised of cohesive silty clay glacial till and fill from surface grade to a depth of approximately 25 to 30 feet (elevation of approximately 675 to 680 feet above msl). The silty clay is underlain by a mass waste deposit predominantly composed of unconsolidated sand and gravel that contains variable amounts of silt and clay. It is readily distinguished by its high percentage of angular gravel clasts composed of dolomite. It is typically very poorly sorted, and grades to sand and silt toward the base of the deposit at some locations. It is very likely the mass waste unit referred to here is the Lemont Drift referenced by Willman (1971). However, in this document, this lithology will be referred to as the mass waste unit.

A cohesive clayey silt comprises a lower glacial till that underlies the mass waste deposit at an elevation of approximately 662 feet msl in the vicinity of the former TCE fill pipe. The lower clayey silt till extends down to an approximate elevation of 643 to 650 feet msl, at which point it is underlain by a lower sand at some locations, but extends to the weathered bedrock surface at other locations within Areas 1 and 2. The lower sand contains significant amounts of silt and clay.

The four primary glacial lithologic units above bedrock described above (the upper fill/till, the mass waste unit, the lower till, and the lower sand) were sampled extensively during investigations conducted in the vicinity of the former TCE fill pipe and analyzed to determine geotechnical properties. The geotechnical parameters analyzed were grain size (including hydrometer), non-carbonate organic carbon (Heron et al. 1997), moisture content, specific gravity, and bulk density. The results of these analyses are presented in Table 2.4.7-1. Lithologic descriptions contained in boring logs in Appendix 9.4 have been rectified according to these geotechnical analyses. Table 2.4.7-2 is a summary table of these geotechnical analyses that presents averages for each parameter determined by lithologic unit. It would appear the geotechnical analyses of these soil samples are reasonable, with the exception of the moisture content in the lower sand. These results appear to be biased on the low side due to drainage of the samples during storage in plastic bags.

In Areas 1 and 2, the upper weathered portion of the Silurian dolomite is encountered at an elevation of approximately 630 msl. The competent dolomitic bedrock surface typically occurs at approximately 620 to 625 feet msl.

A significant amount of topographic slope occurs from north to south on the MetCoil property and results in significantly lower surface grade elevations in Area 3. The construction of the retention basin in the southern portion of Area 3 has exaggerated this. The net result of these topographic changes is that the surficial silty clay glacial till and fill gradually thins to the south to the point where the mass waste sand and gravel is exposed at surface grade within the storm water retention basin at the south end of Area 3.

A transitional environment of deposition within the lower till unit appears to exist on the southern portion of the MetCoil parcel. It appears that the lower till contains a higher percentage of sand where it was observed at monitoring well nest MW-1113. However, the lithologies still exhibited a cohesive nature and, therefore, are indicative of high percentages of silt and clay. At this time, no borings have extended to bedrock along the southern property boundary. As a result, the existence of the lower till within or below the mass waste sand and gravel, and above bedrock in this portion of the site, is undetermined.

Cross-sections have been prepared to illustrate the sequence of lithologies described above and their lateral variation across the Lockformer site. Figure 2.4.7-1 is a cross-section reference map that shows the location of each cross-section. Figure 2.4.7-2 presents cross-section A-A'. Figure 2.4.7-3 presents cross-section B-B'. Figure 2.4.7-4 presents cross-section C-C'.

As part of the investigations related to the Lockformer site, monitoring wells MW-1603, MW-1604, and MW-1605 have been installed in the glacial sediments above bedrock along Front Street in the subdivision to the south of the Lockformer site. Three groundwater monitoring well nests have also been installed on the west side of the Ellsworth Industrial District to the southeast of the Lockformer site. The wells located on the west side of the Ellsworth Industrial District include MW-1600S/D, MW-1601S/D, and MW-1602S/D. These wells were abandoned in late-April 2002 per the access agreement between Lockformer and the respective property owners.

The geologic data from drilling these offsite wells were used to develop cross-sections for these areas south and southeast of the Lockformer site. Figure 2.4.7-5 is a cross-section reference map for these offsite locations. Figure 2.4.7-6 illustrates cross-section A-D', which goes from the Lockformer site into the Front Street subdivision.

Figure 2.4.7-7 contains cross-sections E-E' and F-F'. Cross-section E-E' is an east-to-west profile along Front Street and under I-355 to the east into the Ellsworth Industrial District. Cross-section F-F' is a north-to-south profile along the west side of the Ellsworth Industrial District.

Cross-section A-D' in Figure 2.4.7-6 was developed in part from a review of residential boring logs for the Front Street subdivision, which were obtained from the ISWS. These residential boring logs, and a map identifying the location of each residential well log, is provided in Appendix 9.5. Cross-section E-E' was aided in development through use of borings 5-B-49 and 5-B-50 obtained from the Illinois Tollway Authority and performed during the planning of construction of I-355.

Figure 2.4.7-6 illustrates the sequence of geologic materials in cross-section from the north under the Lockformer site to the south under the Front Street subdivision. South of monitoring well MW-1113D on the Lockformer site, only limited data are currently available to allow interpretation and construction of this cross-section. The southern end of Area 3 is significantly lower in topographic elevation than the remainder of the Lockformer site. As a result, only a thin veneer of silty clay till (approximately 3 to 7 feet in thickness) exists at the surface to cover the mass waste sand and gravel. In each instance while drilling at the southern end of Area 3, the mass waste sand and gravel was encountered continuously below this upper veneer of silty clay down to the water table, and as deep as 8 feet below it. Further to the south along cross-section A-D in the vicinity of Front Street, similar lithologies are observed. However, a depositional transition occurs along Front Street from west to east. This depositional transition is depicted on cross-section E-E' and results in the mass waste sand and gravel at monitoring well MW-1603 transitioning into an alluvial sequence associated with St. Joseph Creek further to the east at monitoring wells MW-1604 and MW-1605. This alluvial sequence appears to be a series of interbedded sands and fine-grained overbank deposits associated with the deposition of the St. Joseph Creek valley train. This valley train is identified as the Mackinaw Member of the Henry Formation (Willman 1971).

Even further to the east along cross-section E-E', on the east side of I-355 in the Ellsworth Industrial District, the alluvial sequence associated with St. Joseph Creek was encountered again at monitoring well MW-1602 S/D. Cross-section E-E' also includes the Illinois Tollway Authority boring 5-B-50 which, again, appears to indicate the presence of the alluvial sequence associated with St. Joseph Creek. This alluvial sequence associated with St. Joseph Creek appears to occur south of Area 3 on the Lockformer site and form a lateral contact with the mass waste unit at the south end of Area 3.

Further to the south of Front Street, the topographic elevation rises significantly from approximately 690 to 758 feet msl (see cross-section A-D). This results in a thickening of the surficial silty clay glacial till. However, drillers' logs contained in Appendix 9.5 for the Front Street subdivision indicate that a thick sequence of sand and gravel exists below the surficial silty clay till, and is immediately over the Silurian dolomite bedrock. A similar sequence of deposits appears to exist on the west side of the Ellsworth Industrial District in Figure 2.4.7-7 cross-section E-E'. This coarse-grained sequence of sediments immediately over bedrock appears to pinch out to the south in both the Front Street subdivision south of Gamble Street, and in the Ellsworth Industrial District near Thatcher Street. The lithologic descriptions from drillers' logs for the Front Street subdivision area are not of sufficient detail to make any inference regarding the environment of deposition for the coarse-grained sediments immediately over bedrock. These coarse-grained lithologies encountered immediately over the Silurian dolomite on the west side of the Ellsworth Industrial District appear to have been associated with a glaciofluvial depositional episode. At monitoring well locations MW-1601 S/D and MW-1602 S/D on the west side of the Ellsworth Industrial District, these glaciofluvial deposits exist immediately on top of the Dolomite, and have mass waste sediments deposited directly on top of them.

2.4.8 Area Hydrogeology

Groundwater in the glacial drift sediments and Silurian dolomite in DuPage County has been discussed in several publications prepared by the ISWS and ISGS. The publications by Zeizel et al. (1962) and Sasman et al. (1981) include or summarize most of the original studies and analysis contained in other reports on these subjects. Some of the pertinent hydrogeologic information contained in these reports is identified below to facilitate more detailed discussions later in this report.

Groundwater occurs variably across the area in the glacial drift. Most of DuPage County is covered by fine-grained glacial ground and end moraine till. Locally, these deposits are interrupted by coarse-grained alluvium associated with creeks and rivers. The glacial drift also contains coarse-grained, water-bearing sediments associated with glaciofluvial and ice contact features. These coarse-grained alluvial and glacial drift sediments transmit groundwater from recharge areas to discharge areas, and supply recharge to the Silurian dolomite. The variability of this recharge from the glacial drift to the Silurian dolomite is likely to be highly variable. Areas where coarse-grained, unconsolidated, saturated sediments are in direct hydraulic connection to the bedrock are expected to be the dominant recharge zones. In areas where fine-grained glacial tills are present over the Silurian aquifer, it is likely that recharge to the dolomite is significantly reduced. Estimates of the recharge to the Silurian aquifer have been made based on the withdrawal from wells and the resulting cone of depression that developed (Walton 1962). Based on these techniques, the average recharge in the eastern two-thirds of DuPage County was determined to be approximately 2.94 inches per year.

In general, the upper portion of the Niagaran aquifer is highly weathered and fractured and produces greater yields than the remainder of the Niagaran aquifer. This upper, weathered, and fractured portion of the Niagaran aquifer has been observed by drillers in DuPage County as a reliable water-bearing zone and is the most productive portion of the aquifer. In fact, a review of the 655 well logs for wells finished in the Silurian aquifer in DuPage County suggests that approximately 194 (30%) penetrate only 0 to 20 feet into the dolomite, and 221 (34%) penetrate only 20 to 40 feet into the rock (Zeizel et al. 1962). This data suggests that approximately 64% of the wells in DuPage County only penetrate as deep as 40 feet into the Silurian dolomite. The Niagaran aquifer is generally more productive than the Alexandrian aquifer. Most of the water production appears to be generated through the highly fractured, upper, weathered surface of the dolomite and from bedding planes deeper in the rock. Extensive development and inter-connection of these fractures are indicated by the high yield of wells completed in these zones, the uniformity of the potentiometric surface of the dolomite, the reliability of the Silurian aquifer as a source of groundwater to wells, and the observation that pumping wells have been known to impart measurable drawdown in observation wells as much as 3,490 feet away (Zeizel et al. 1962)

The transmissivity of the Silurian dolomite averages 15,240 ft^2/d (Zeizel et al. 1962). Table 2.4.4-1 identifies the computed transmissivity and hydraulic conductivity of the Silurian aquifer based on specific capacity tests performed on wells in the area of the Lockformer site. The effective porosity of the Silurian dolomite has been estimated based on water withdrawn from storage as 0.017 over the entirety of DuPage County (Sasman et al. 1981) and in the Chicago Heights area as 0.03 (Prickett et al. 1964).

2.4.8.1 Site Hydrogeology

Investigations in Areas 1 and 2 indicate that groundwater occurs variably within the surficial silty clay till and fill. At some locations, wells completed in the upper surficial silty clay till and fill will encounter groundwater that will yield to a well and allow sampling. At other locations, wells completed in the surficial silty clay till and fill are dry. The surficial silty clay till and fill in Areas 1 and 2 generally occurs from surface grade to approximately 25 to 30 feet in depth.

Groundwater occurring within the surficial silty clay till and fill does not appear to form a water table condition. Instead, it appears groundwater variably occurs within the surficial silty clay till and fill, and is controlled by the occurrence of fractures and coarse-grained lithologies contained within this surficial silty clay till and fill sequence.

The glacial mass waste sand and gravel occurs below the surficial silty clay till and fill. This mass waste sand and gravel is predominantly composed of unconsolidated sediments, and exhibits significantly increased permeabilities over those in the surficial silty clay till and fill. Some isolated portions of the mass waste unit across Areas 1 and 2 exhibit a loosely cohesive nature indicative of a greater percentage of fine-grained lithologies and lower hydraulic conductivities.

The investigations in Areas 1 and 2 indicate the mass waste unit across these areas is positioned above a silty clay glacial till. This lower silty clay glacial till has been determined to be present below the mass waste sand and gravel over the entirety of Areas 1 and 2 in each boring drilled to its depth. The upper surface of the lower silty clay glacial till occurs at an approximate elevation of 662 feet msl in the vicinity of the former TCE fill pipe.

The mass waste sand and gravel is unsaturated in the vicinity of the former TCE fill pipe where extensive soil contamination occurs. The contact between the upper surface of the lower silty clay glacial till and the mass waste unit slopes down away from the area of the former TCE fill pipe. When the upper surface of the lower till surface slopes below an elevation of approximately 655 feet msl, groundwater saturates the mass waste sand and gravel sediments to form a water table condition. The upper surface of the lower silty clay glacial till slopes down in areas to the west and south away from the former TCE fill pipe. Figure 2.4.8-1 is a three-dimensional (3-D) view of the Lockformer site from the southwest. Figure 2.4.8-2 is the same 3-D view of the Lockformer site as the previous figure except that the upper silty clay fill/till and mass waste unit are stripped off to expose the water table condition that exists in areas away from the former TCE fill pipe. Figure 2.4.8-3 is a 3-D view of the Lockformer site that provides the reference for 3-D view cross-sections A-A', B-B', and C-C', Figures 2.4.8-4, Figure 2.4.8-5, and Figure 2.4.8-6, respectively.

These figures were all constructed using lithologic data collected from monitoring wells and borings drilled onsite. In order to make the 3-D representations, some simplification of the lithologic sequences at the site must be made. The 3-D figures presented have been constructed by grouping lithologies by hydrostatigraphic unit. These hydrostratigraphic units can generally be observed as the major color groupings when performing a review of the cross-sections presented in Figure 2.4.7-2 through Figure 2.4.7-7. The 3-D representations were developed in Environmental Systems Research Institute (ESRI) ArcView v. 8.1 and 3-D Analyst v. 1.0.

Figure 2.4.8-2 and the cross-section A-A' in Figure 2.4.8-4 show the unsaturated mass waste unit sediments in the vicinity of the former TCE fill pipe (MW-1108 S/D). These figures illustrate the topographic high in the lower till surface and its downward slope away from the former TCE fill pipe area. In the areas away from the former TCE fill pipe area, after the upper surface of the lower till dips below an elevation of approximately 655 feet msl, saturated conditions occur within the mass waste unit. A single well, MW-500D, has been completed in saturated sediments between the former TCE fill pipe and the area of the site where this water table condition occurs in the mass waste unit. Monitoring well MW-500D is likely to be completed in an undulation in the upper surface of the lower till. All other monitoring wells besides MW-1108S/D installed in this area are completed in the lower till. These monitoring wells (MW-500D, MW-1108 S/D, and the monitoring wells completed in the lower till) are not in direct hydraulic connection with the saturated water table sediments at the base of the mass waste unit.

A series of potentiometric surface maps have been developed for the saturated glacial sediments occurring during the early stages of investigation from May through September 2001. The static water level measurements in groundwater monitoring wells, public water supply wells, and staff gauges used to prepare the hydrologic figures presented in this report are included in Table 2.4.8-1. Figure 2.4.8-7 is the glacial drift potentiometric surface map for May 2001. Figure 2.4.8-8 is the glacial drift potentiometric surface map for June 2001. Figure 2.4.8-9 is the glacial drift potentiometric surface map for August 2001. Figure 2.4.8-10 is the glacial drift potentiometric surface map for September 20, 2001. The potentiometric surface map for September 20, 2001 includes groundwater monitoring wells MW-1110S, MW-1111S, and MW-1112S installed on the Ogden Corporate Center property to the west of the MetCoil property.

A review of these glacial drift potentiometric surface plots indicates that all groundwater monitoring wells completed in saturated sediments within the mass waste unit have the static water level indicated adjacent to the well. Monitoring well MW-500D was not used because it is completed in an undulation in the surface of the lower till that collects groundwater not hydraulically connected to the mass waste unit water table. The remaining wells on these figures (printed in gray) are not completed in saturated sediments of the mass waste unit.

In September, October and November 2001 additional investigations were undertaken at the south end of the MetCoil property in Area 3, at offsite locations along Front Street, and along the west side of Ellsworth Industrial District. These investigations involved the installation of wells completed in the glacial sediments in Area 3 and along Front Street, and the installation of wells completed in the glacial sediments and the Silurian dolomite aquifer in the Ellsworth Industrial District. The nature of the glacial sediments at the south end of Area 3 and into the Front Street subdivision can be reviewed in cross-section A-D in Figure 2.4.7-6. The nature of the glacial sediments along the west side of the Ellsworth Industrial District can be reviewed in cross-section F-F' in Figure 2.4.7-7.

Recent investigations in Area 3 indicate the presence of a transitional environment of deposition in the lower till below the mass waste sand and gravel. A limited thickness of saturated sediments occurs in the coarse-grained sediments above the lower till in the vicinity of monitoring well nest MW-1113. At monitoring well nest MW-1113, a 6-foot clay separates the overlying 3- to 4-foot-thick saturated zone in unconsolidated, saturated sediments from the underlying saturated, coarse-grained sediments below.

Further to the south in Area 3 along the southern boundary of the site, investigations to date have primarily been directed toward determining the extent of soil contamination related to releases from the Lisle sanitary sewer system. As a result, the depth of investigation has extended down only to the water table. The water table in this area occurs within the mass waste sand and gravel at a depth of approximately 26 feet.

The nature of the glacial sediments above bedrock changes significantly south of the Lockformer site Area 3. Somewhere between the Lockformer south property boundary and Front Street, the mass waste sediments transition into the alluvial sequence of sediments associated with the St. Joseph Creek valley train. The St. Joseph Creek alluvial sequence was encountered at groundwater monitoring wells MW-1603, MW-1604, and MW-1605 along Front Street, and MW-1602S on the east side of I-355 in the northwest portion of the Ellsworth Industrial District. This alluvial sequence appears to be predominantly composed of interbedded fine-to-medium-grained sands and overbank deposit clays.

The additional investigations in Area 3 and offsite areas have provided the data to develop more complete potentiometric surface maps for the Lockformer site. The static water level measurements from November 2001, February 2002, and March 2002 were used to develop potentiometric surface maps for the glacial sediments and appear in Figures 2.4.8-11, Figure 2.4.8-12, and Figure 2.4.8-13, respectively. A review of these figures indicates a west-to-southwest groundwater flow direction in the mass waste sediments in Area 2. In Area 3, the groundwater flow in the mass waste sediments appears to be south-to-southwest.

South of Area 3, the groundwater flow appears to be impacted by the St. Joseph Creek alluvial sequence. The groundwater in the mass waste unit at the south end of Area 3 appears to discharge into the alluvial sequence south of Area 3. The alluvial sequence appears to have an eastern component of flow. The apparent disparate groundwater flow in the alluvial sequence south of Area 3 is most likely the result of hydraulic conductivity differences between the mass waste unit and the alluvial sequence. Visual observation of core samples acquired during drilling suggests that the coarse-grained lithologies of the alluvial sequence exhibit increased hydraulic conductivities.

The potentiometric surface maps for November 2001, February 2002, and March 2002 (Figure 2.4.8-11, Figure 2.4.8-12, and Figure 2.4.8-13) allow the calculation of the hydraulic gradient observed in the mass waste unit on the west side of Area 2 and on to the Ogden Corporate Center property to the west. On these dates, the groundwater flow on the west side of Area 2 was approximately to the west and southwest. The hydraulic gradient, as measured between monitoring well MW-522 and monitoring wells MW-1110S and MW-1111S ranged from 0.0009 to 0.002.

The potentiometric surface maps for November 2001 and March 2002 (Figure 2.4.8-11 and Figure 2.4.8-13) allow the calculation of the hydraulic gradient observed in the mass waste unit of Area 3. On both of these dates, the groundwater flow in Area 3 was approximately to the south with a hydraulic gradient ranging from 0.0015 to 0.0025.

Hydraulic conductivity testing has not been performed on any wells on the Lockformer site completed in the saturated water table sediments. Visual observation and grain size analyses of the mass waste unit would suggest that the unit has an approximate hydraulic conductivity in the range of $5x10^{-4}$ to $5x10^{-3}$ cm/sec. Monitoring well MW-500D completed in a saturated depression on top of the lower till in the mass waste unit exhibited a slug test hydraulic conductivity of $3x10^{-4}$ cm/sec. Assuming an approximate effective porosity for the mass waste unit of 0.20, the expected range of the average linear seepage velocity for groundwater in the mass waste unit on the west side of Area 2 can be calculated. These calculations suggest that the approximate seepage velocity for groundwater in the mass waste unit on the west side of Area 2 ranges from 2.3 to 52 feet per year. Making the same effective porosity assumption of 0.2 for the mass waste unit in Area 3, a similar groundwater seepage velocity calculation can be made for that area. These calculations suggest that the approximate seepage velocity for groundwater in the mass waste unit in Area 3 ranges from 4 to 65 feet per year.

As part of the hydrogeologic investigations at the Lockformer facility, 12 groundwater monitoring wells completed in the Silurian dolomite aquifer have been installed onsite. Three groundwater monitoring wells completed in the Silurian dolomite aquifer have been installed west of the Lockformer property on the Ogden Corporate Center property. Three groundwater monitoring wells have been completed in the Silurian dolomite aquifer within the Front Street subdivision, and three groundwater monitoring wells have been completed in the Silurian dolomite southeast of the Lockformer site in the Ellsworth Industrial District.

Each well installed during the Lockformer investigation was installed by drilling and continuously coring the glacial drift sediments from surface grade to bedrock, and determining the exact depth at which competent bedrock was encountered. On average, this coring indicated that approximately 4 to 6 feet of weathered dolomite exists at the bedrock surface in the vicinity of the Lockformer site. After the initial coring was complete, a steel surface casing was set and grouted in-place from surface grade into the competent dolomite at each location. Each bedrock well was then cored from the bottom of the surface casing to completion depth, and left as an open hole in the bedrock. While coring out from the surface casing, each bottom 7 feet of core hole was isolated through use of a single packer and tested for yield and water quality. The water quality results of these samples are discussed in Section 6.0. The yield from these single packer tests is provided in Table 2.4.8-2. A review of Table 2.4.8-2 indicates that several coreholes below the surficial interval did not produce water. This appears to be consistent with the general observations that the upper weathered and fractured zone in the Silurian dolomite exhibits the greatest hydraulic conductivities.

Throughout the investigation, static water levels have been measured in the groundwater monitoring wells. In addition, staff gauges placed on the East Branch of the DuPage River and standby public water supply wells owned by the Village of Downers Grove were incorporated into the water level measurement program. The Village of Lisle was contacted regarding access to their standby wells for incorporation into the study, but Village officials were uncooperative. Citizens Utilities, a private water company, approved the use of its well on Primrose Street in Lisle. However, water level measurements from this well were unsuccessful due to an obstruction in the well. Each monitoring well, public water supply well, and staff gauge location were surveyed by a registered surveyor. The resulting water level measurements appear in Table 2.4.8-1.

The water level measurements in Table 2.4.8-1 were used to construct semi-regional potentiometric surface maps for the Silurian dolomite aquifer in the Lisle and Downers

Grove area. Five semi-regional water level measurements were obtained during the period of study. These water level measurement dates were all used to develop potentiometric surface maps for the Silurian dolomite aquifer. The dates and figure numbers for these potentiometric surface maps are as follows: July 12, 2001 appears in Figure 2.4.8-14; September 10, 2001 appears in Figure 2.4.8-15; November 30, 2001 appears in Figure 2.4.8-16; February 14, 2002 appears in Figure 2.4.8-17; and March 20, 2002 appears in Figure 2.4.8-18.

A review of recent potentiometric surface maps for the Lisle and Downers Grove semi-regional area reveals the dramatic effect that discontinuing the operation of the production wells had on the groundwater flow in the Silurian dolomite aquifer in the vicinity of the Lockformer. Groundwater flow in the vicinity of the Lockformer site that; by all historic records, flowed generally to the west in the Silurian dolomite until 1992 when operation of the Lisle production wells ceased, now flows to the southeast. The interpretations of groundwater flow in the Silurian dolomite aquifer include the use of staff gauges on the East Branch of the DuPage River for the following reasons:

- Cross-sections developed for the area by the ISWS and ISGS indicate the alluvium associated with the East Branch of the DuPage River is in direct hydraulic connection with the Silurian dolomite aquifer
- Previous measurements, analysis, and interpretations performed by the ISWS and ISGS indicate the East Branch of the DuPage River is in direct hydraulic connection to the Silurian dolomite aquifer
- Extrapolation of potentiometric contours drawn from wells to the East Branch of the DuPage River appear to fit and are consistent with the interpretation of groundwater flow in the Silurian dolomite aquifer under non-storm event, base flow conditions.

The recent potentiometric surface maps developed for the Silurian dolomite aquifer provide data to analyze the aquifer's hydraulic gradient. On the five dates of measure in the vicinity of the Lockformer site (defined as the approximate area between groundwater monitoring well MW-1106 and the Downers Grove public water supply well #10, the

Katrine Avenue well), the hydraulic gradient of the Silurian dolomite aquifer ranged from 0.0006 to 0.001 and averaged 0.00086. Further to the southeast and downgradient in the groundwater flow between the Downers Grove Katrine Avenue well and the 67th Street and 71st Street wells, the Silurian dolomite aquifer hydraulic gradient ranged from 0.0005 to 0.0006 and averaged 0.00052. The lower hydraulic gradient exhibited by the Silurian dolomite aquifer southeast of the Katrine Avenue well may suggest increased hydraulic conductivity of the aquifer over this area.

The vertical gradients between the saturated glacial sediments and the Silurian dolomite aquifer in the vicinity of the Lockformer site vary. Table 2.4.8-1 identifies the static water levels collected in Areas 1 and 2 (and on the Ogden Corporate Center) where the lower till is present. There is a predominant vertical gradient downward from the saturated mass waste unit sediments to the bedrock. This is the result of the lower till impeding vertical movement of groundwater.

Vertical gradients south of Area 3 along Front Street are available for the period from December 2000 through March 2002 and are summarized in Table 2.4.8-3. Data used to develop this table include the water level measurements from piezometer P-3, bedrock wells BW-2 and BW-3 installed by Carlson Environmental, and monitoring wells MW-1603 and MW-1605 installed by Clayton. Piezometer P-2 (installed by Carlson Environmental) was available for measurement and analysis during the time period on Table 2.4.8-3. However, this piezometer was not drilled deep enough to encounter the water table condition that exists in the glacial sediments. An analysis of the vertical gradients south of Area 3 along Front Street available from Table 2.4.8-3 indicates that on seven of the nine measurement dates, an upward vertical gradient was exhibited from the Silurian dolomite aquifer to the saturated glacial sediments.

The upward vertical gradient observed in the monitoring wells along Front Street is likely to be the result of well screens installed in the bedrock wells at sufficient depth to isolate them from the highly fractured, weathered surface of the dolomite. The only bedrock wells to be completed with screens during the Lockformer investigations were installed by Carlson Environmental along Front Street and Riedy Road. The tops of these well screens are completed approximately 42 to 52 feet below the weathered zone at the top of the Silurian dolomite. As a result, the most likely explanation for the upward vertical gradient observed along Front Street is the lower bedrock interval discharging to the more transmissive weathered and fractured upper surface of the dolomite, and the hydraulically connected St. Joseph Creek alluvial sequence.

The velocity of groundwater flow in the Silurian dolomite is currently difficult to quantify. One difficulty here is distinguishing the groundwater flow in the upper weathered and highly fractured zone from the groundwater flow in the lower more competent dolomite. Observations during drilling, from bedrock cores retrieved during drilling, down-hole video logs of the coreholes, and the packer tests performed on the coreholes indicate that this upper, weathered and highly fractured zone is approximately 10 to 20 feet thick. Due to the highly weathered and fractured nature of this upper portion of the dolomite, it is anticipated that this portion of the rock is in direct hydraulic connection with any saturated, coarse-grained, glacial sediments directly over it, and could be expected to react in conjunction with those sediments as an equivalent porous media, and single hydrostratigrapic unit. However, below this upper weathered and highly fractured interval in the more competent dolomite, groundwater appears to occur predominantly along bedding planes and individual fractures. As observed through the Clayton single and double packer testing, the yield of the more competent bedrock is highly variable and, as a result, it could be anticipated that the hydraulic conductivity and effective porosity is highly variable.

Further complicating the ability to estimate the groundwater flow velocity through the Silurian dolomite is the difficulty of obtaining reliable hydraulic conductivity values for the various portions of the rock. The difficulties here can be summarized as follows:

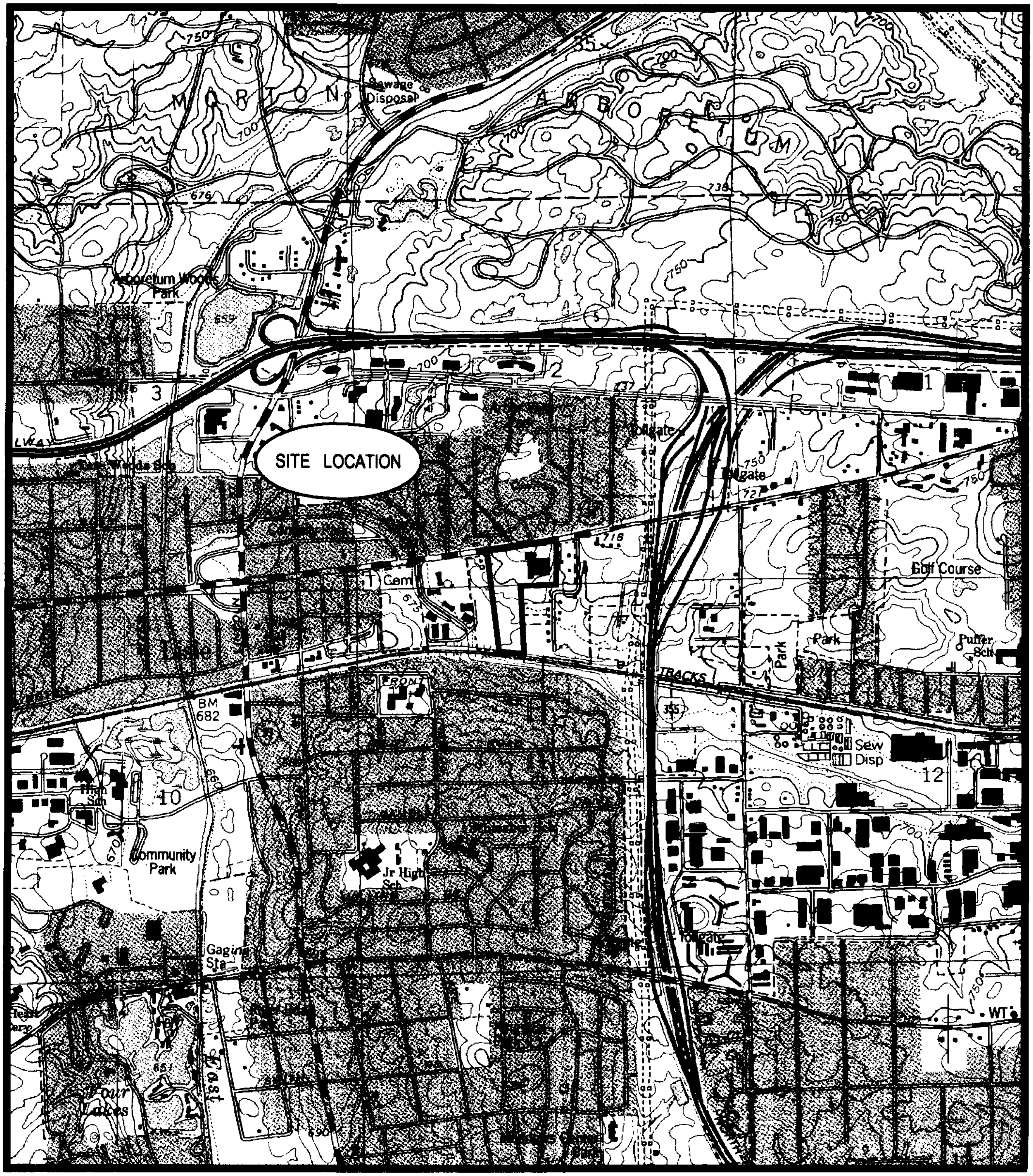
- Most analyses developed from data involving a pumping well have not distinguished the hydraulic conductivity differences between the upper, weathered, and highly fractured portion of the Silurian dolomite from the competent rock sections.

- Transmissivity and hydraulic conductivity data developed from specific capacity testing may have a tendency to overestimate the transmissivity and hydraulic conductivity because the tests are of short duration (24 hours or less) and because the tests have not been performed to determine the maximum sustainable yield-specific capacity value, which could be significantly less than other specific capacity determinations in fractured rock at lesser pumping rates.

The values of transmissivity and hydraulic conductivity identified in Table 2.4.4-1 were developed from specific capacity testing of the wells identified, and the data should be viewed in that light.

SECTION 2.0

FIGURES



Scale 1:24000

0 1/2 1 MILE

1000 0 1000 2000 3000 FEET

FIGURE 2.4-1

SITE LOCATION MAP

THE LOCKFORMER COMPANY
711 OGDEN AVENUE
LISLE, ILLINOIS

(SOURCE OF MAP IS USGS 7.5 MINUTE QUADRANGLE MAP, WHEATON, ILLINOIS)

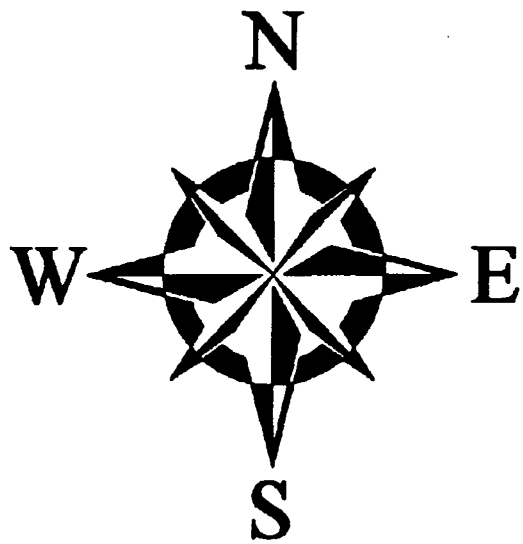
CHECK BY	DJL
DRAWN BY	BCP / OS
DATE	4-5-02
SCALE	AS SHOWN
CAD NO.	6526307Y
PRJ NO.	65263.01

SITE MAP ILLUSTRATING AREAS 1, 2 AND 3

LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 2.4-2



g_Map.MXD
7/02
: SFS

Clayton℠
GROUP SERVICES

Project: Lockformer 15-65263.01

Figure 2.4.1 - 1

AVE.

FIGURE 2.4.1-2

PANY'S ADDITION TO LISLE

SCALE : ONE INCH = FORTY FEET

ORDER NO.: 91-12065

ORDERED BY : MR. HAROLD H. STOVER
FOR THE LOCK FORMER COMPANY

STATE OF ILLINOIS
S.S.
COUNTY OF DUPAGE

TO:
THE LOCK FORMER COMPANY.

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE "MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS", JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND ACSM IN 1988; AND MEETS THE ACCURACY OF A CLASS "A" SURVEY, AS DEFINED THEREIN.

GIVEN UNDER MY HAND AND SEAL THIS 27th DAY OF FEBRUARY, 1991.

Paul N. Marchese

ILLINOIS PROFESSIONAL LAND SURVEYOR NO. 2461

NOTE : EXCEPTING ANY EASEMENTS OR CLAIMS OF EASEMENTS NOT SHOWN IN PUBLIC RECORDS.

BMH

FIGURE 2.4.1-3

SCALE: ONE INCH = FIFTY FEET

ORDER NO.: 90-11811

ORDERED BY: MR. HAROLD H. STOVER
FOR THE LOCK FORMER COMPANY

STATE OF ILLINOIS
S.S.
COUNTY OF DUPAGE

TO:
THE LOCK FORMER COMPANY,

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE "MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS", JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND ACSM IN 1988; AND MEETS THE ACCURACY OF A CLASS "A" SURVEY, AS DEFINED THEREIN.

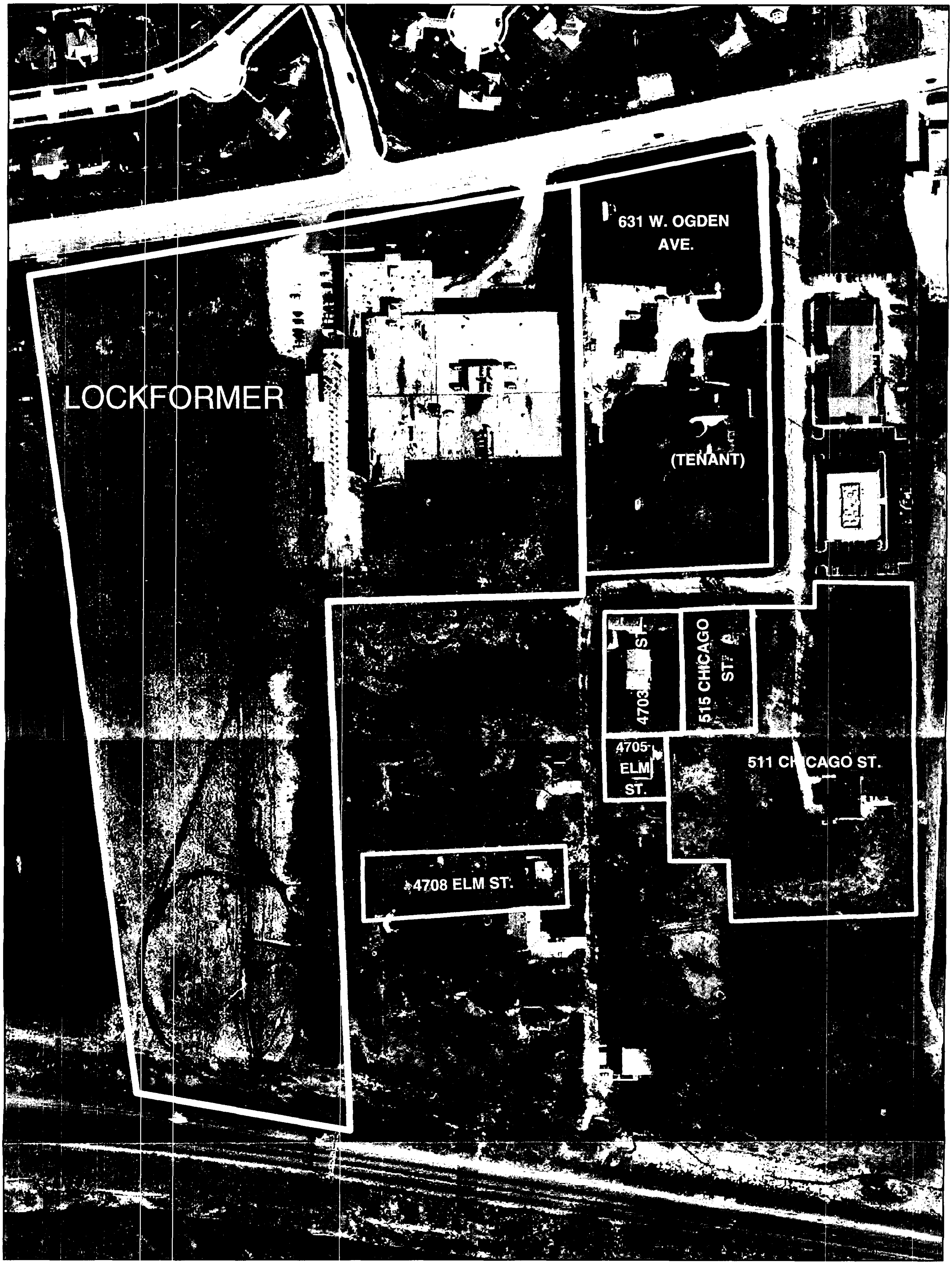
GIVEN UNDER MY HAND AND SEAL THIS 4th DAY OF JUNE, 1990.

ILLINOIS REGISTERED LAND SURVEYOR NO. 2461

NOTE : EXCEPTING ANY EASEMENTS OR CLAIMS OF EASEMENTS NOT SHOWN IN PUBLIC RECORDS. BMH.

, 1990	CORRECTED DIMENSIONS.
E	REVISION

REVISION SCHEDULE



GROUNDWATER ANALYSES FROM HOMES LOCATED ALONG AUVERGNE, CHICAGO AND ELM STREETS

LEGEND

Property Boundaries

0 150 300 Feet

Figure 2421.MXD
Date: 05/05/02
Drawn By: SFS

Clayton Group Services

Project: Lockformer 15-65263.01

Figure 2.4.2- 1

LEGEND

THE FORMER DEGREASER AREA

POTENTIAL AREA IMPACTED BY DELIVERY SPILLS

EXISTING AND FORMER DRAINAGE WAYS

SANITARY SEWER SYSTEM

SCALE IN FEET

0 75 150 300

NOTE: SITE BOUNDARY LINE APPROXIMATE, AS ILLUSTRATED IN THE PARENT FIGURE PROVIDED BY THE USEPA.

CHECK BY	
DRAWN BY	BCP
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08N
PRJ NO.	65263.01

KNOWN, SUSPECTED OR POTENTIAL SOURCES OF CONTAMINATION AT THE LOCKFORMER SITE

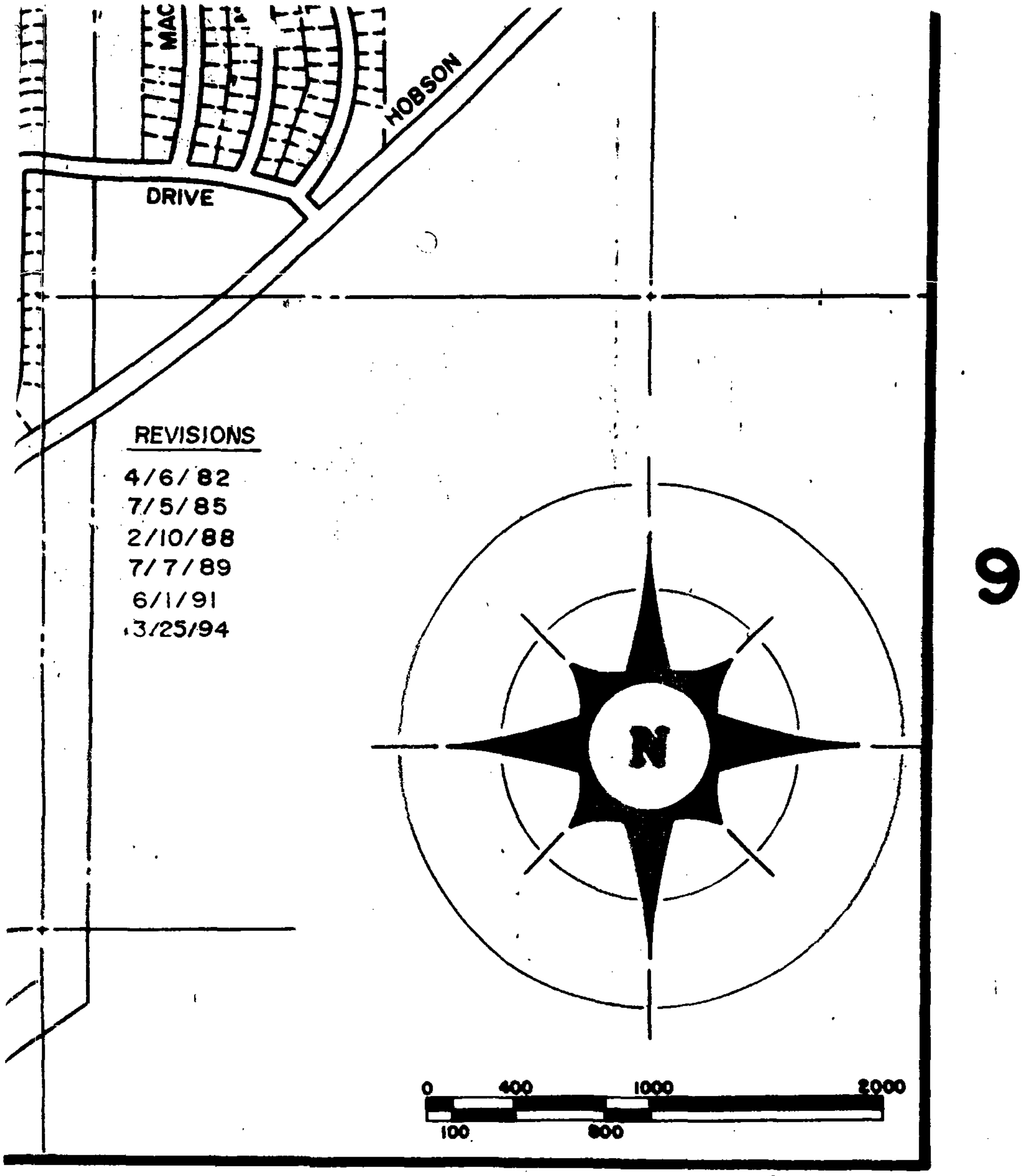
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton℠ GROUP SERVICES

FIGURE 2.4.3-1

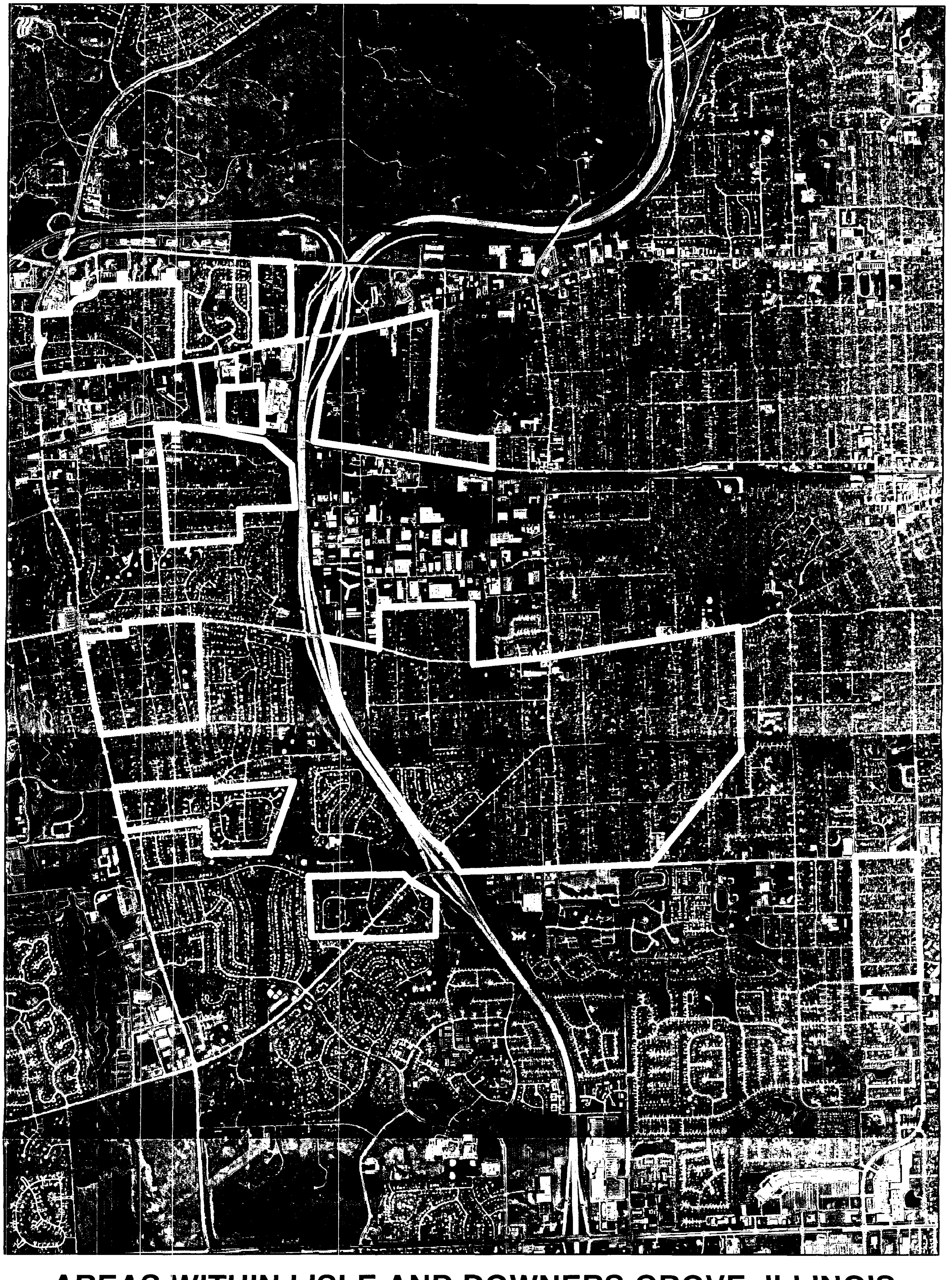
KNOWN, SUSPECTED, OR POTENTIAL SOURCES
OF CONTAMINATION IN THE
VICINITY OF THE LOCKFORMER
SITE

DRAWN BY: SRS	Clayton GROUP SERVICES
CHECKED BY:	
DATE: 5/5/02	
SCALE: AS SHOWN	
FIGURE NO. Potential_Sources.apr	FIGURE 2.4.3-2
PROJECT NO. 15-65263	



MAC
HOBSON
DRIVE
REVISIONS
4/6/82
7/5/85
2/10/88
7/7/89
6/1/91
3/25/94
N
0
400
1000
2000
100
800
9

FIGURE 2.4.3-3



AREAS WITHIN LISLE AND DOWNERS GROVE, ILLINOIS WITH RESIDENTIAL WATER WELLS

LEGEND

Areas with Residential Water Wells

0 2,000 4,000 Feet

Figure 2441.MXD
Date: 05/05/02
Drawn By: SFS

Clayton GROUP SERVICES

Project: Lockformer 15-65263.01

Figure 2.4.4 - 1

'ER - 1960

N

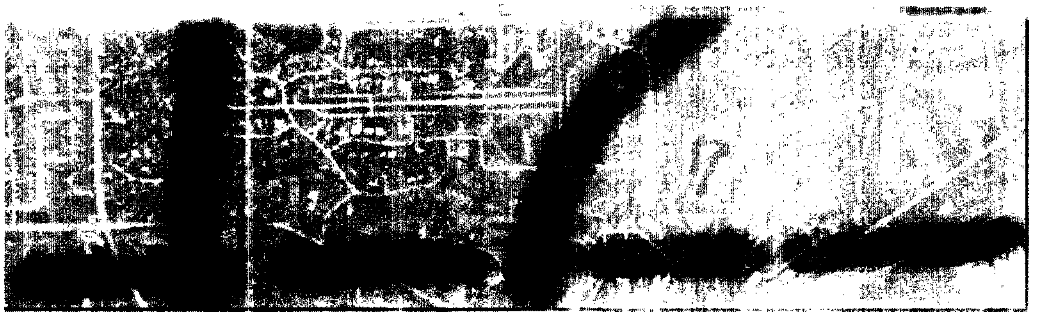
21,120
Feet

Figure 2442.mxd
DATE: 05/02/02
Drawn by: SFS

Clayton[SM]
GROUP SERVICES

PROJECT: LOCKFORMER 15-65263.01

FIGURE 2.4.4 - 2



IFER - 1966

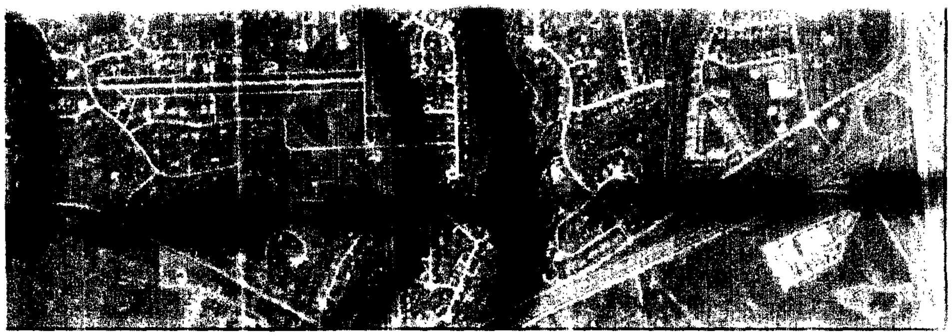
N

Figure 2443.MXD DATE: 05/02/02 Drawn by: SFS	Clayton[SM] GROUP SERVICES

149

PROJECT: LOCKFORMER 15-65263.01

FIGURE 2.4.4 - 3



·ER - 1979

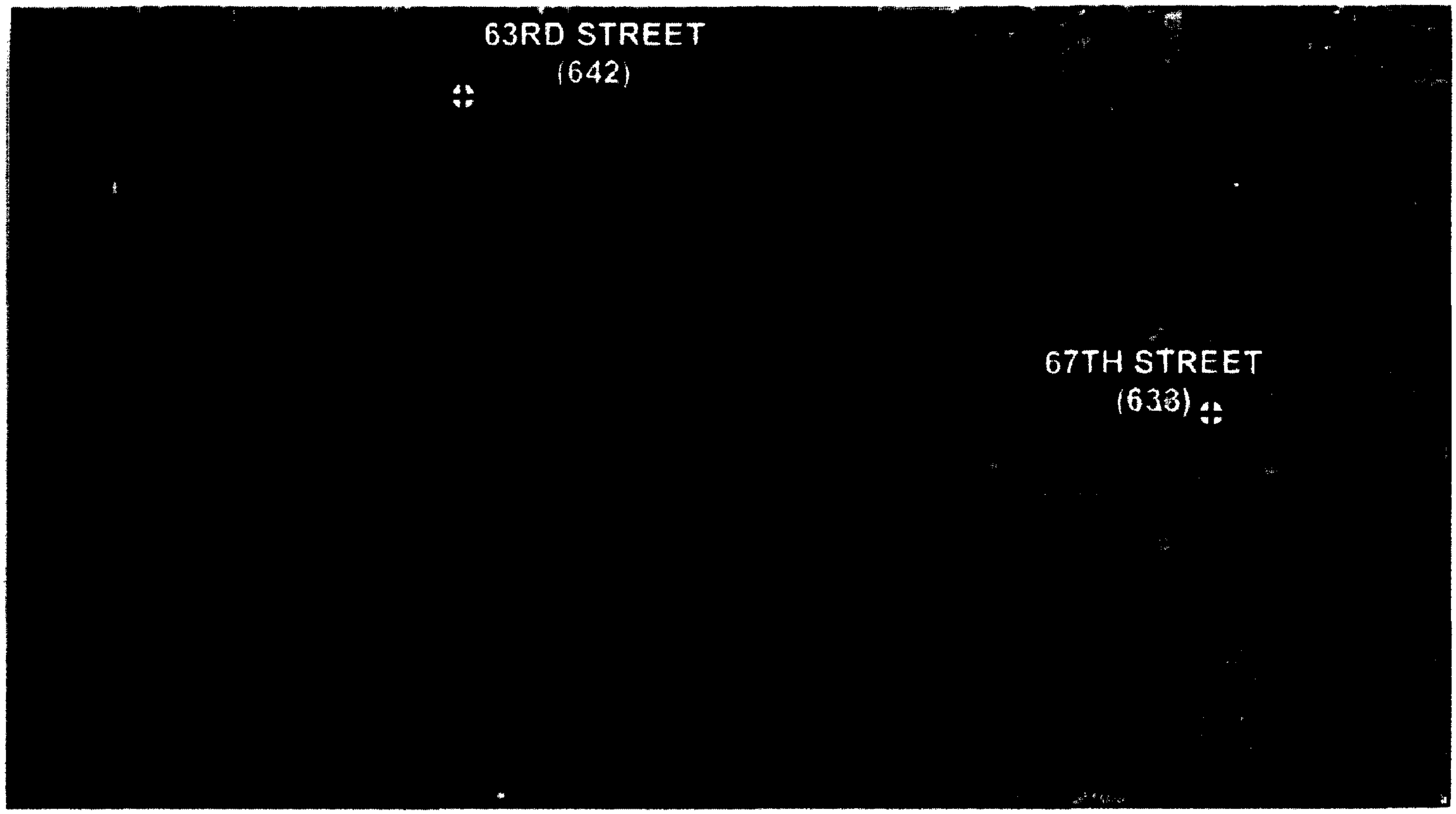
N

Figure 2444.MXD
DATE: 05/02/02
Drawn by: SFS

Clayton[SM]
GROUP SERVICES

PROJECT: LOCKFORMER 15-65263.01

FIGURE 2.4.4 - 4



‑ACE FOR SILURIAN DOLOMITE
‑ER 1985

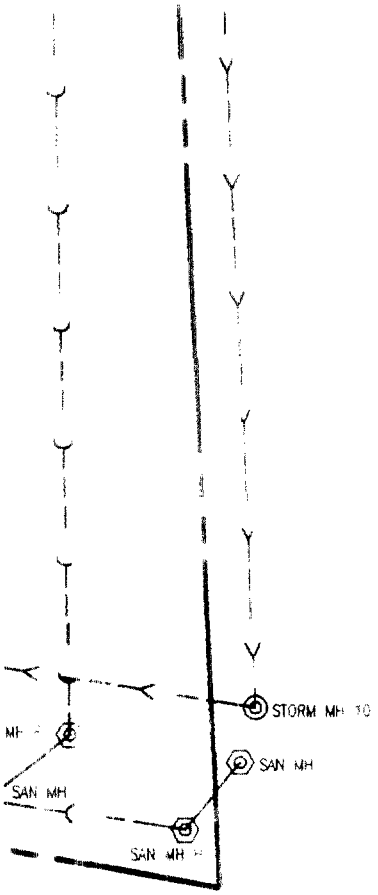
6,300 8,400
Feet

Figure 2445.MXD
Date: 05/03/02
Drawn By SFS

Clayton GROUP SERVICES

PROJECT: LOCKFORMER 15-65263.01

FIGURE 2.4.4 - 5



BENCHMARK:

SOURCE BENCHMARK:
LISLE 4, A BERNTSEN MONUMENT DISK SET AT THE NORTHWEST CORNER OF THE INTERSECTION OF KINGSTON AVENUE AND DIVISION STREETS IN DOWNERS GROVE, ILLINOIS

ELEVATION=720.38

SITE BENCHMARK:
IRON PIPE CONTROL POINT NUMBER 9003 SET AT THE NORTH CENTER POINT OF THE LOCKFORMER PROPERTY ALONG OGDEN AVENUE.

ELEVATION=715.14

MOST RECENT TOPOGRAPHIC FIELD WORK COMPLETED ON NOVEMBER 30, 2001

NOTE: SURVEYED LOCATIONS OF SANITARY AND STORM SEWER LINES AND STRUCTURES WAS CREATED BY MANHARD CONSULTING FOR CLAYTON GROUP SERVICES.

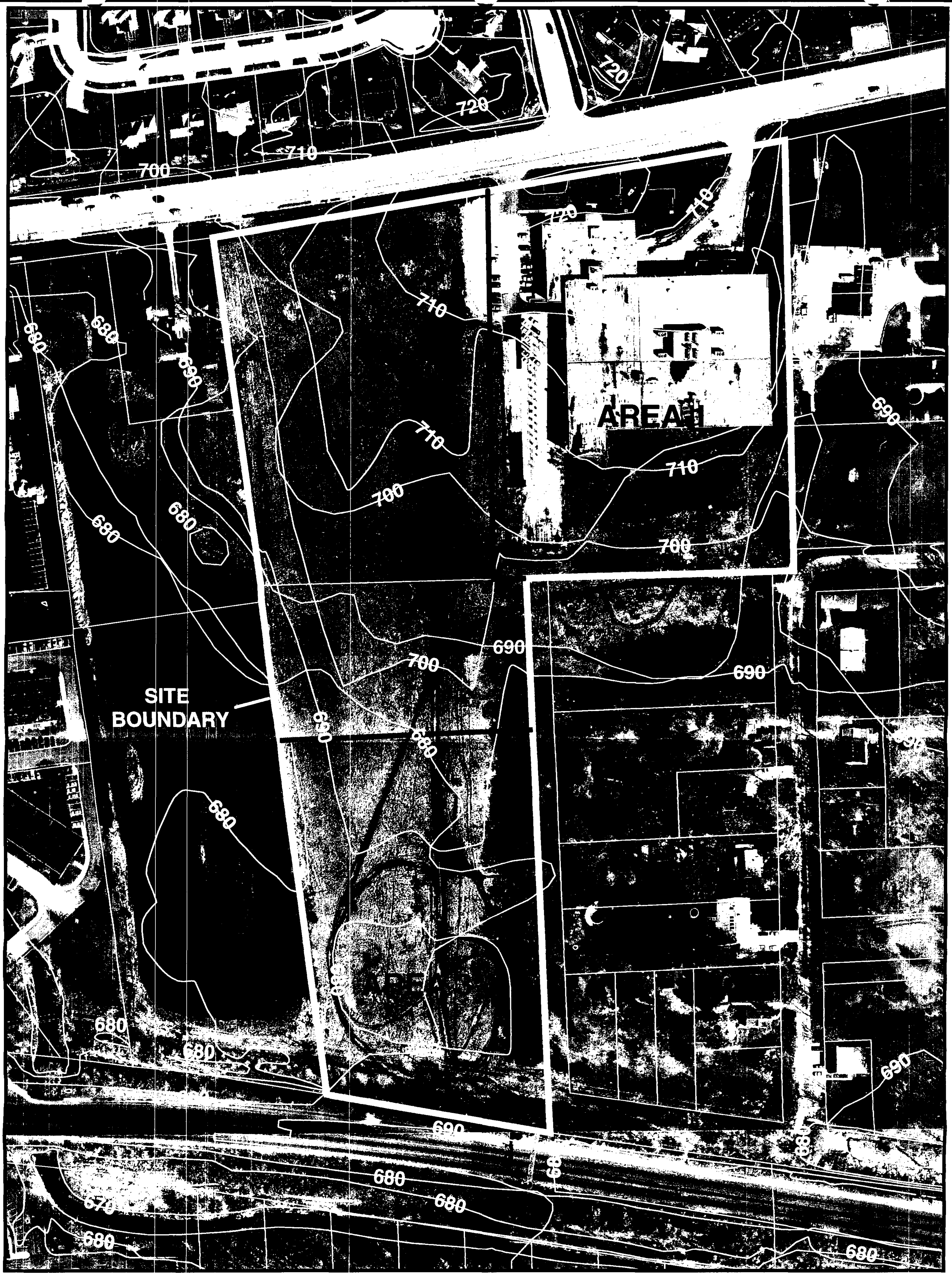
CHECK BY	
DRAWN BY	BCP
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08S
PRJ NO.	65263.01

SITE UTILITIES MAP WITH
STORM AND SANITARY SEWER SYSTEM DETAILS

THE LOCKFORMER COMPANY
71[illegible] W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton
GROUP SERVICES

FIGURE 2.4.5-1



SITE TOPOGRAPHIC MAP: 1962 / 1998

THE LOCKFORMER COMPANY / LISLE, ILLINOIS

N

Legend

1962 Surface Contours 10 Foot Interval

2001 Surface Contours 10 Foot Interval

Parcel Boundaries

0 70 140 280 420 Feet

Note: Map Sources

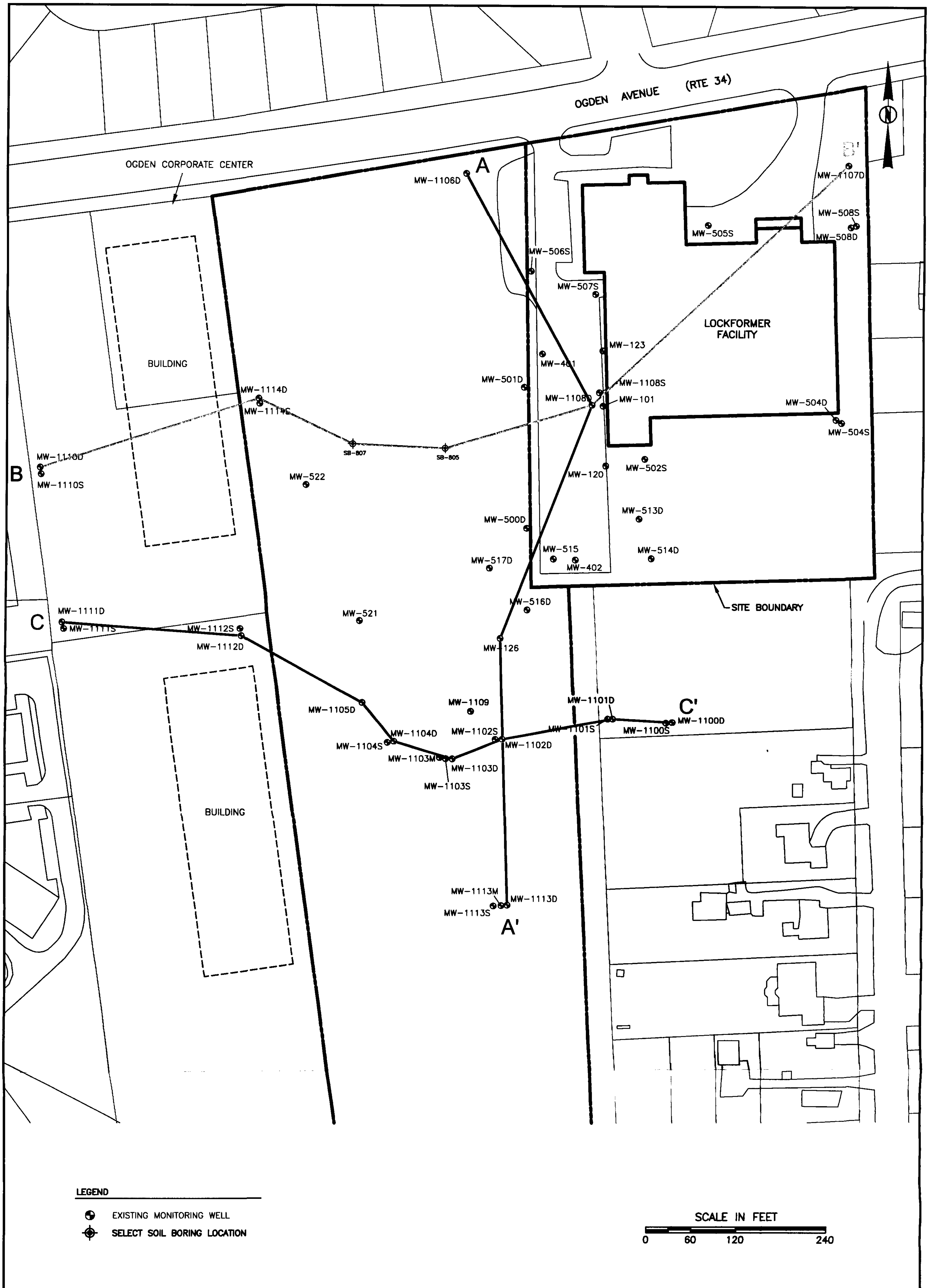
Aerial photograph, propertiy boundaries and 2001 contours obtained from DuPage County Government, date of aerial photography: April 1998.
1962 contour lines obtained from 1962 (Rev.1972 / 1980) USGS Quadrangle - Wheaton, IL

Map is in Illinois State Plane, NAD 83, Feet

Project: 15-65263.01
Figure 2461.mxd
Date: 03/29/02
Drawn by: SFS

Clayton℠ GROUP SERVICES

FIGURE 2.4.6 - 1



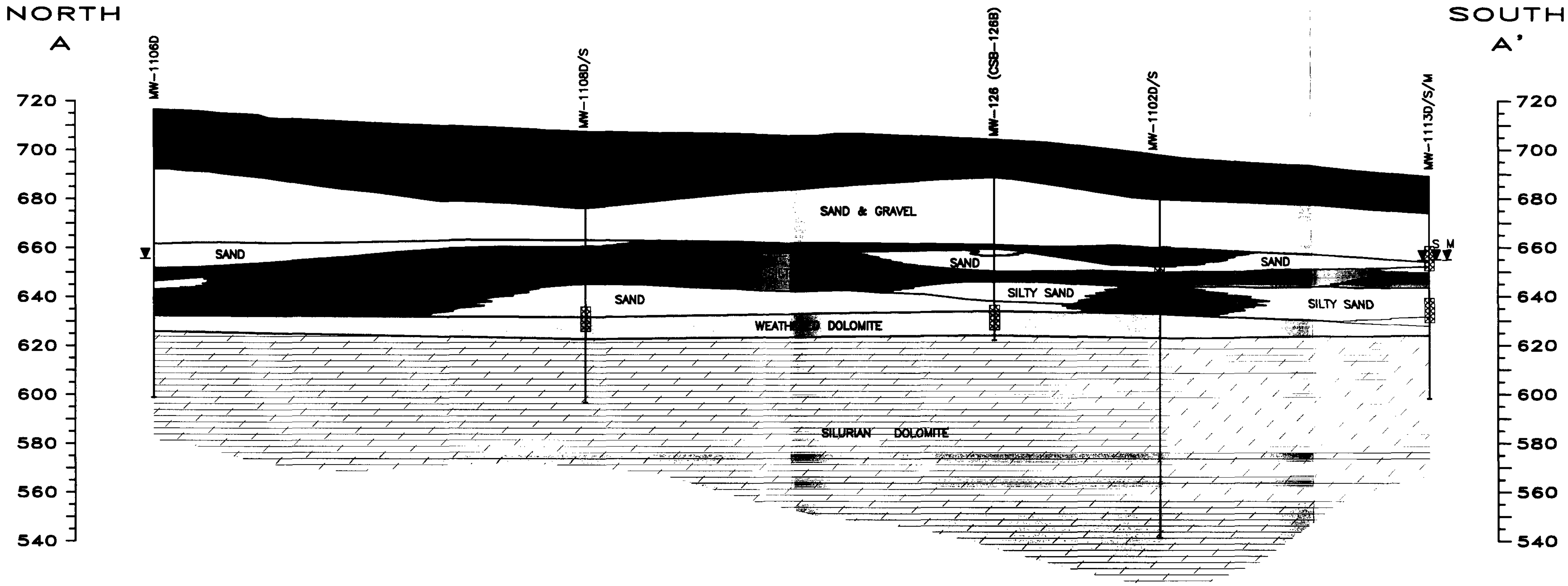
CHECK BY	
DRAWN BY BCP	
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08T
PRJ NO.	65263.01

CROSS-SECTIONS A – A', B – B', C – C'
REFERENCE MAP

THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES
3140 FINLEY ROAD, DOWNERS GROVE, IL 60515

FIGURE 2.4.7-1



- SILTY CLAY
- CLAYEY SILT
- CLAY
- CLAYEY SAND & GRAVEL
- SAND & GRAVEL
- SAND
- SILTY SAND
- SILT
- WEATHERED DOLOMITE
- DOLOMITE

LEGEND

▼ WATER LEVEL MEASURED ON OCTOBER 17, 2001
BEDROCK MEASUREMENT ON LEFT
GLACIAL DRIFT MEASUREMENT ON RIGHT

SCREEN INTERVAL

HORIZONTAL
SCALE IN FEET
0 50 100 200

VERTICAL EXAGGERATION = 2X

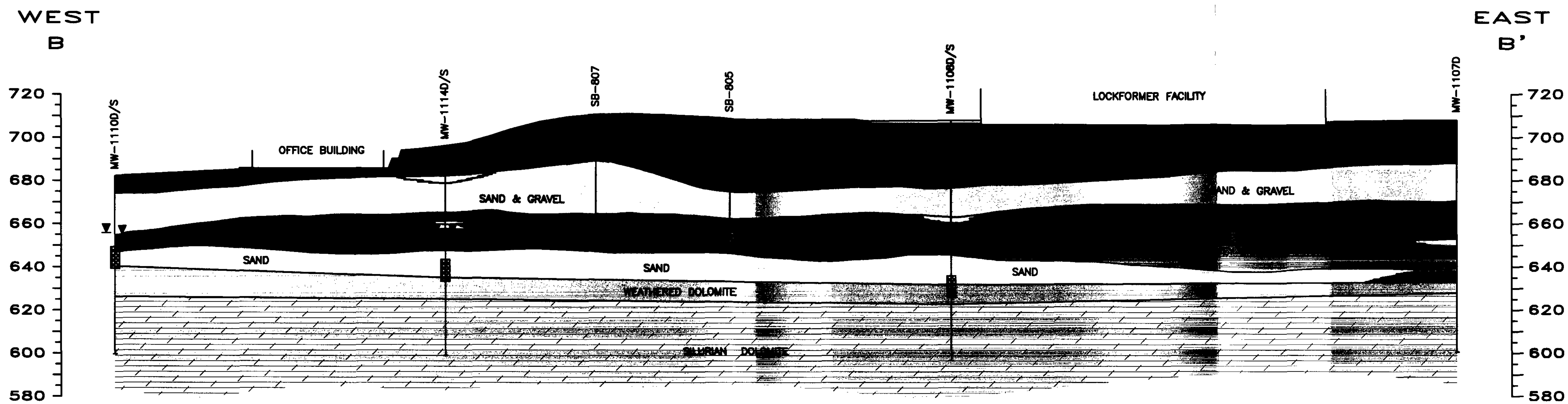
CHECK BY	WSE
DRAWN BY	BCP
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08U
PRJ NO.	65263.01

CROSS-SECTION A – A'

THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE
2.4.7–2



SILTY CLAY
CLAYEY SILT
CLAY
CLAYEY SAND & GRAVEL
SAND & GRAVEL
SAND
SILTY SAND
SILT
WEATHERED DOLOMITE
DOLOMITE

LEGEND

▼ WATER LEVEL MEASURED ON OCTOBER 17, 2001
BEDROCK MEASUREMENT ON LEFT
GLACIAL DRIFT MEASUREMENT ON RIGHT

SCREEN INTERVAL

HORIZONTAL
SCALE IN FEET
0 50 100 200

VERTICAL EXAGGERATION = 2X

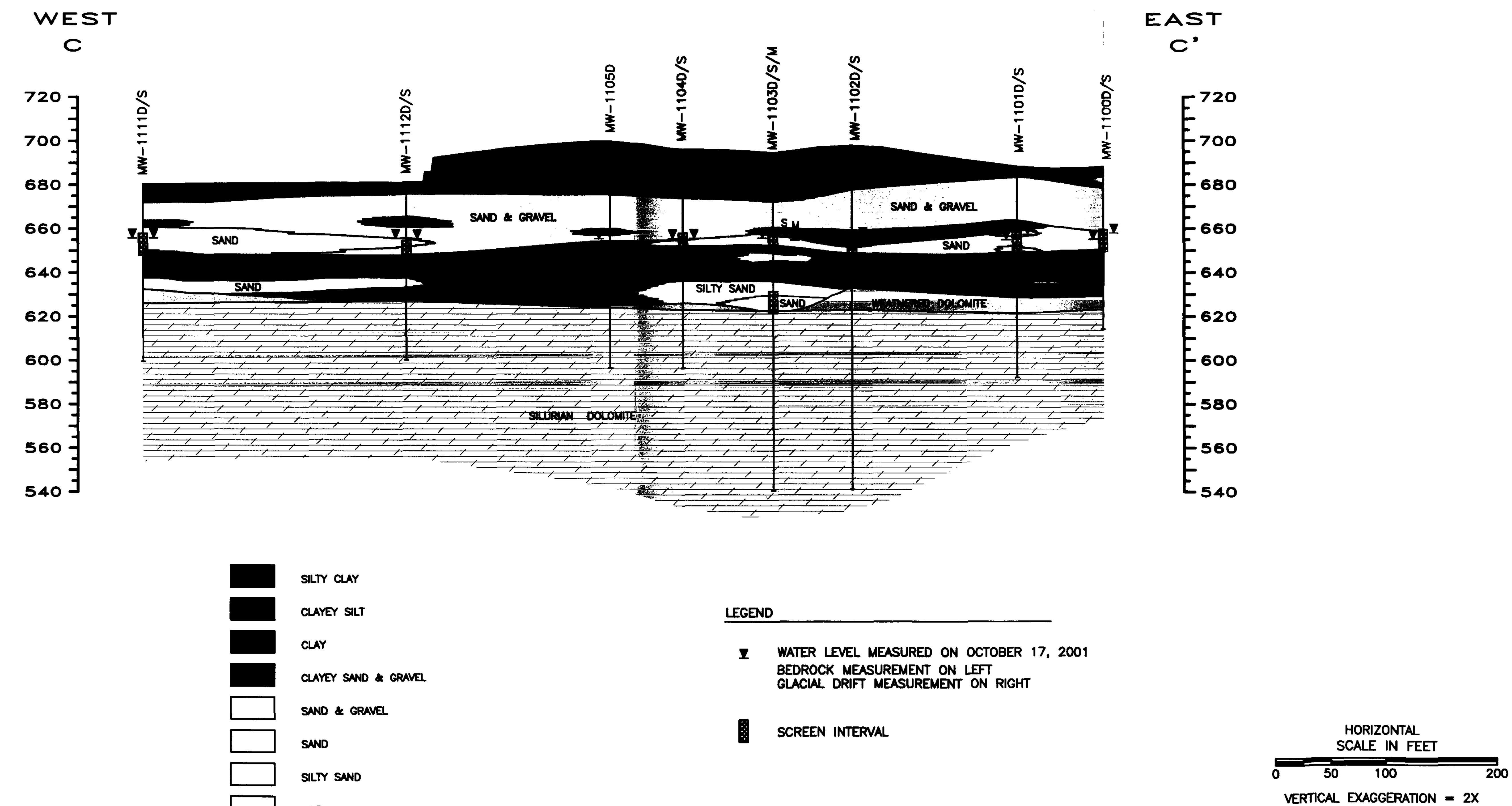
CHECK BY	WSE
DRAWN BY	BCP
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08V
PRJ NO.	65263.01

CROSS-SECTION B – B'

THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton
GROUP SERVICES

FIGURE
2.4.7-3



CHECK BY	WSE
DRAWN BY	BCP
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08W
PRJ NO.	65263.01

CROSS-SECTION C – C'

THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE
2.4.7-4

LEGEND

- EXISTING MONITORING WELL LOCATION
- ▼ APPROXIMATE LOCATION OF RESIDENTIAL WATER SUPPLY WELL
- APPROXIMATE LOCATION OF SOIL BORINGS (BY ILLINOIS STATE TOLL HIGHWAY AUTHORITY)

SCALE IN FEET

0 200 400 800

N

CHECK BY	
DRAWN BY	BCP
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	6526308V
PRJ NO.	65263-01

CROSS SECTIONS A-D', E-E', & F-F'
REFERENCE MAP

THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton℠
GROUP SERVICES

FIGURE 2.4.7-5

CIOFLUVIAL DEPOSIT

IENT USING DATA AVAILABLE AT THE TIME OF
I IN THIS CROSS SECTION WAS GENERALIZED TO
E THICKNESS AND EXTENT OF THE LITHOLOGIC
N BORING LOCATIONS ARE INFERRED.

HORIZONTAL:
SCALE IN FEET
0 60 120 240

VERTICAL SCALE: 1" = 40'
(3x EXAGGERATION)

n	GENERALIZED CROSS SECTION A – D' OGDEN AVENUE TO GAMBLE DRIVE THE LOCKFORMER COMPANY 711 W. OGDEN AVENUE LISLE, ILLINOIS	EXHIBIT 2.4.7–6

SILTY CLAY

CLAYEY SILT

CLAY

CLAYEY SAND & GRAVEL

SAND & GRAVEL

SAND

SILTY SAND

SILT

WEATHERED DOLOMITE

DOLOMITE

NOTE:

CROSS SECTIONS ARE BASED ON BEST PROFESSIONAL JUDGMENT USING DATA AVAILABLE AT THE TIME OF CONSTRUCTION. THE GEOLOGIC INTERPRETATIONS PRESENTED IN THIS CROSS SECTION WAS GENERALIZED TO ILLUSTRATE THE MAJOR LITHOLOGIC UNITS AT THE SITE. THE THICKNESS AND EXTENT OF THE LITHOLOGIC UNITS ARE APPROXIMATED AND GEOLOGIC CONTACTS BETWEEN BORING LOCATIONS ARE INFERRED.

on	GENERALIZED CROSS SECTIONS E – E' AND F – F' THE LOCKFORMER COMPANY 711 W. OGDEN AVENUE LISLE, ILLINOIS	FIGURE 2.4.7–7

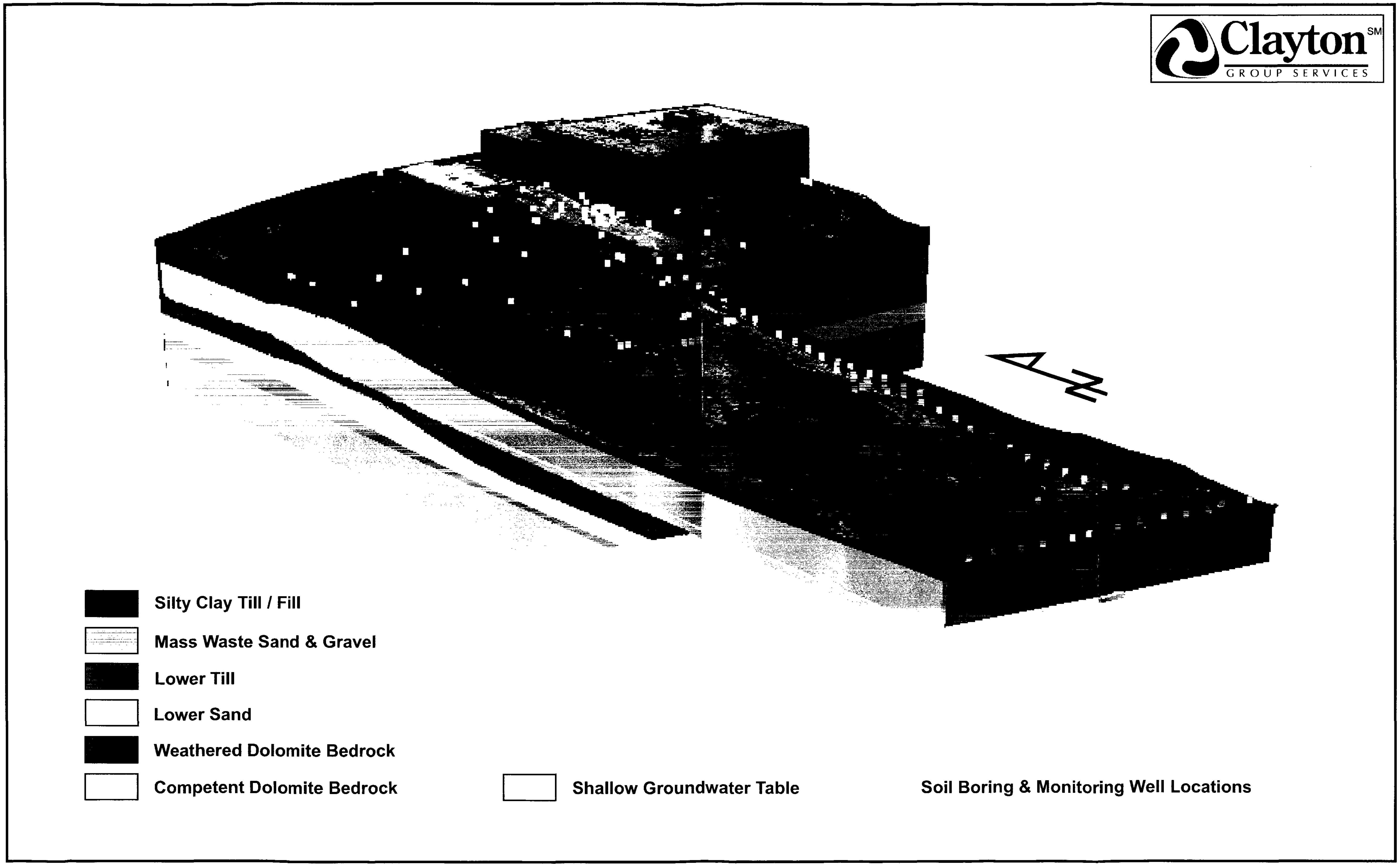


Figure 2.4.8 - 1 3-D View of the Lockformer Site from the SW.

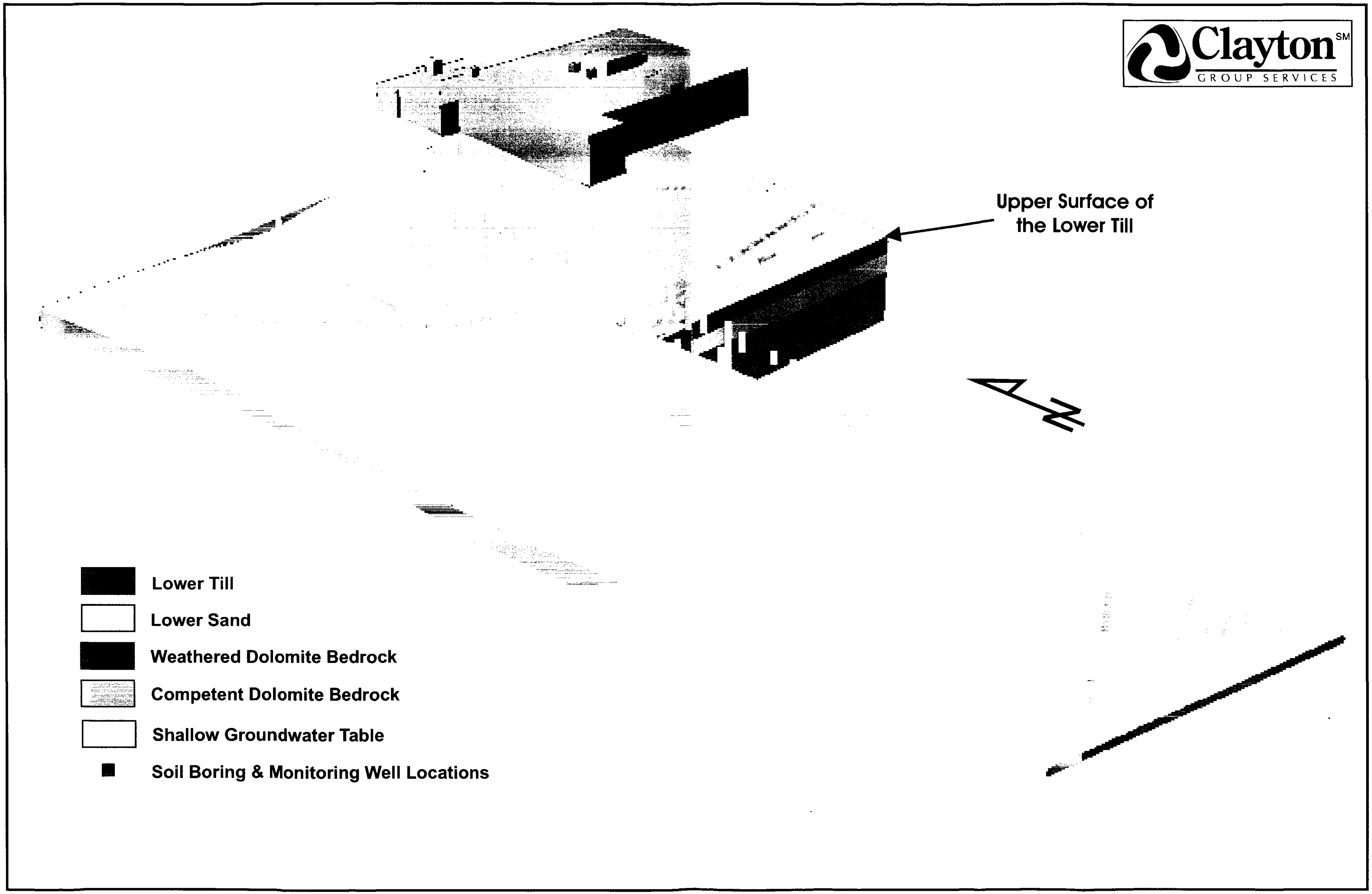


Figure 2.4.8 - 2 3-D View of the Lockformer Site from the SW with Fill/Till and Mass Waste Units stripped away to expose the water table in the Mass Waste Unit.

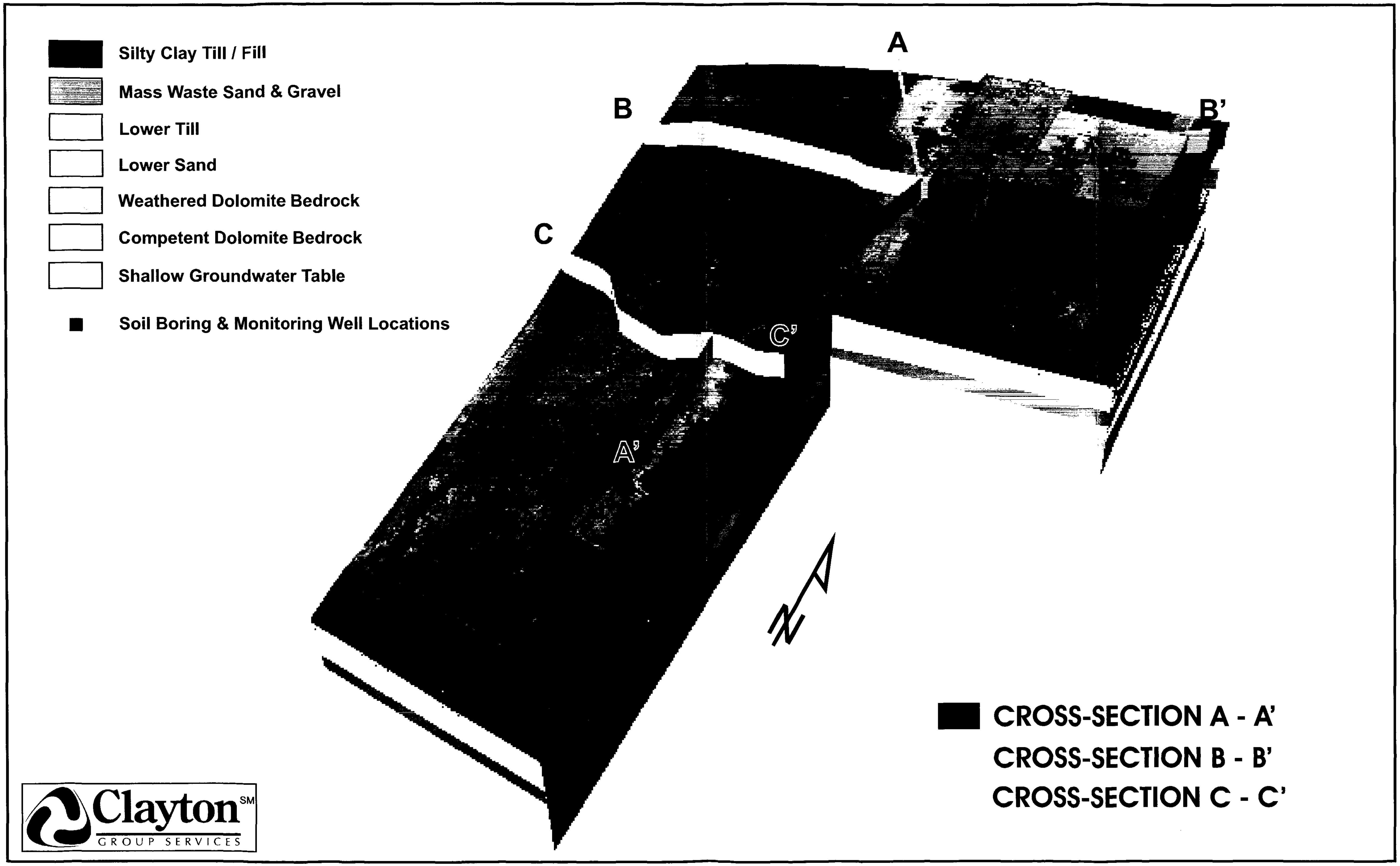


Figure 2.4.8 - 3 3-D Cross-Section Reference Map

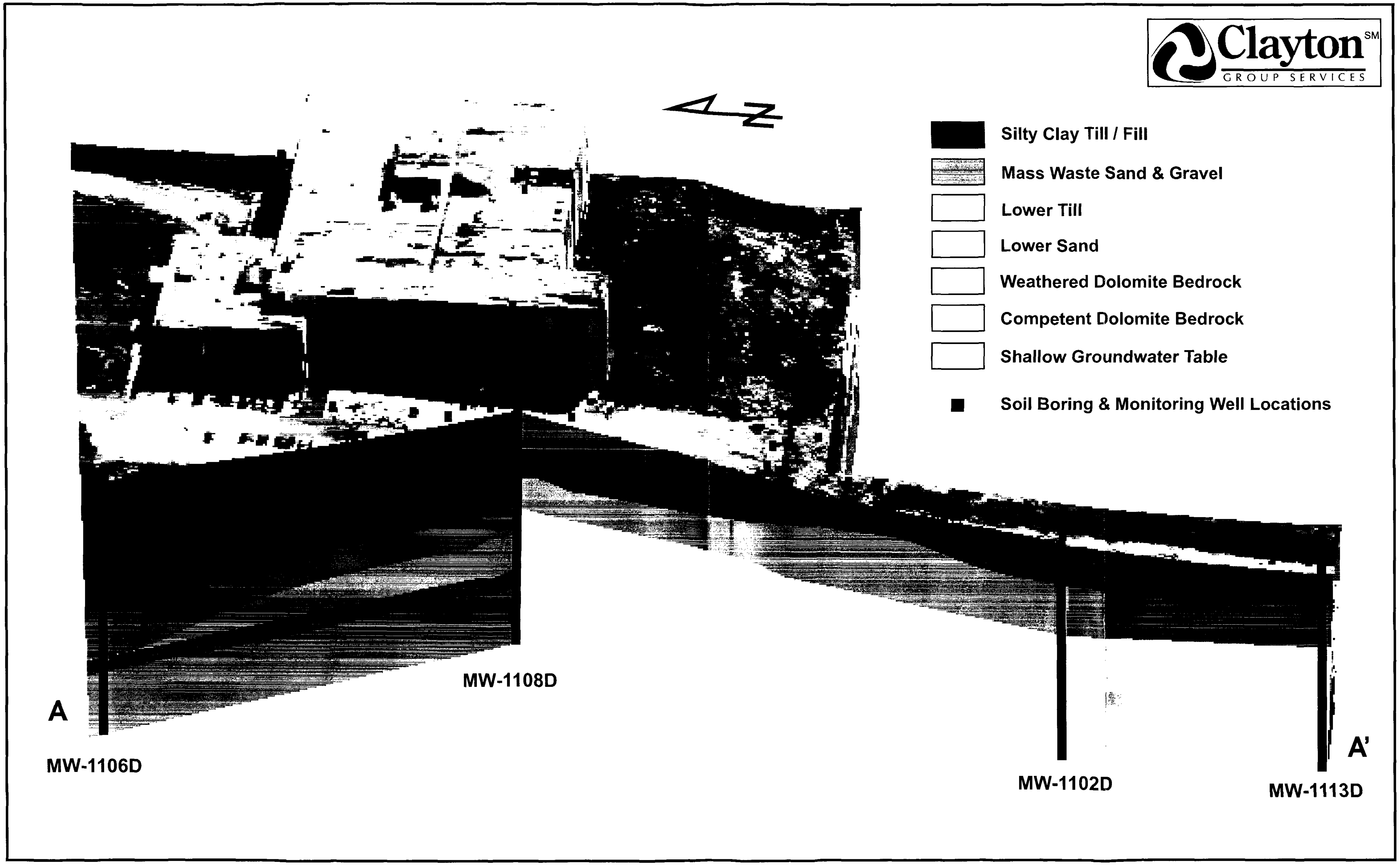


Figure 2.4.8 - 4 3-D Cross-Section - A-A'

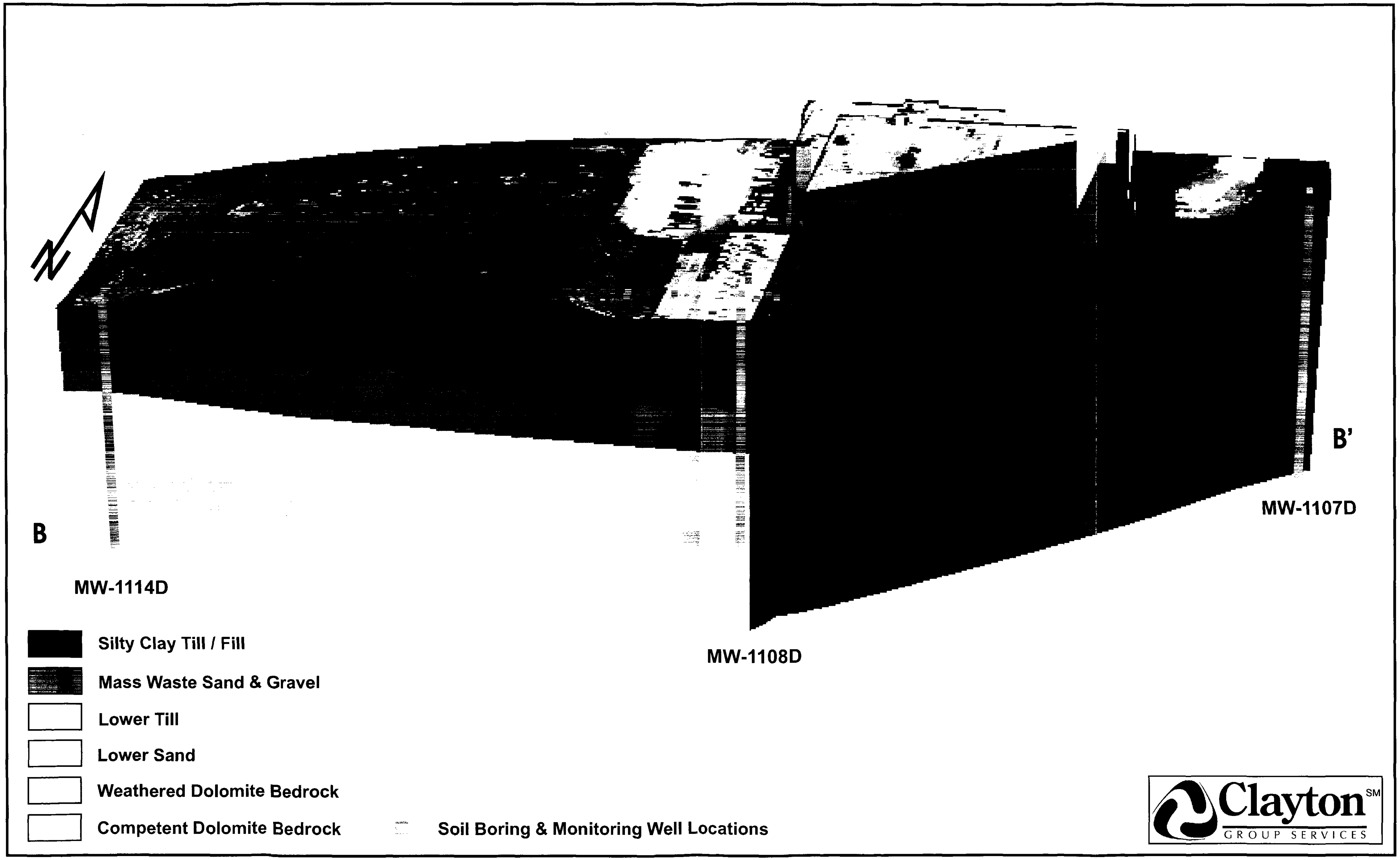


Figure 2.4.8 - 5 3-D Cross-Section B - B'

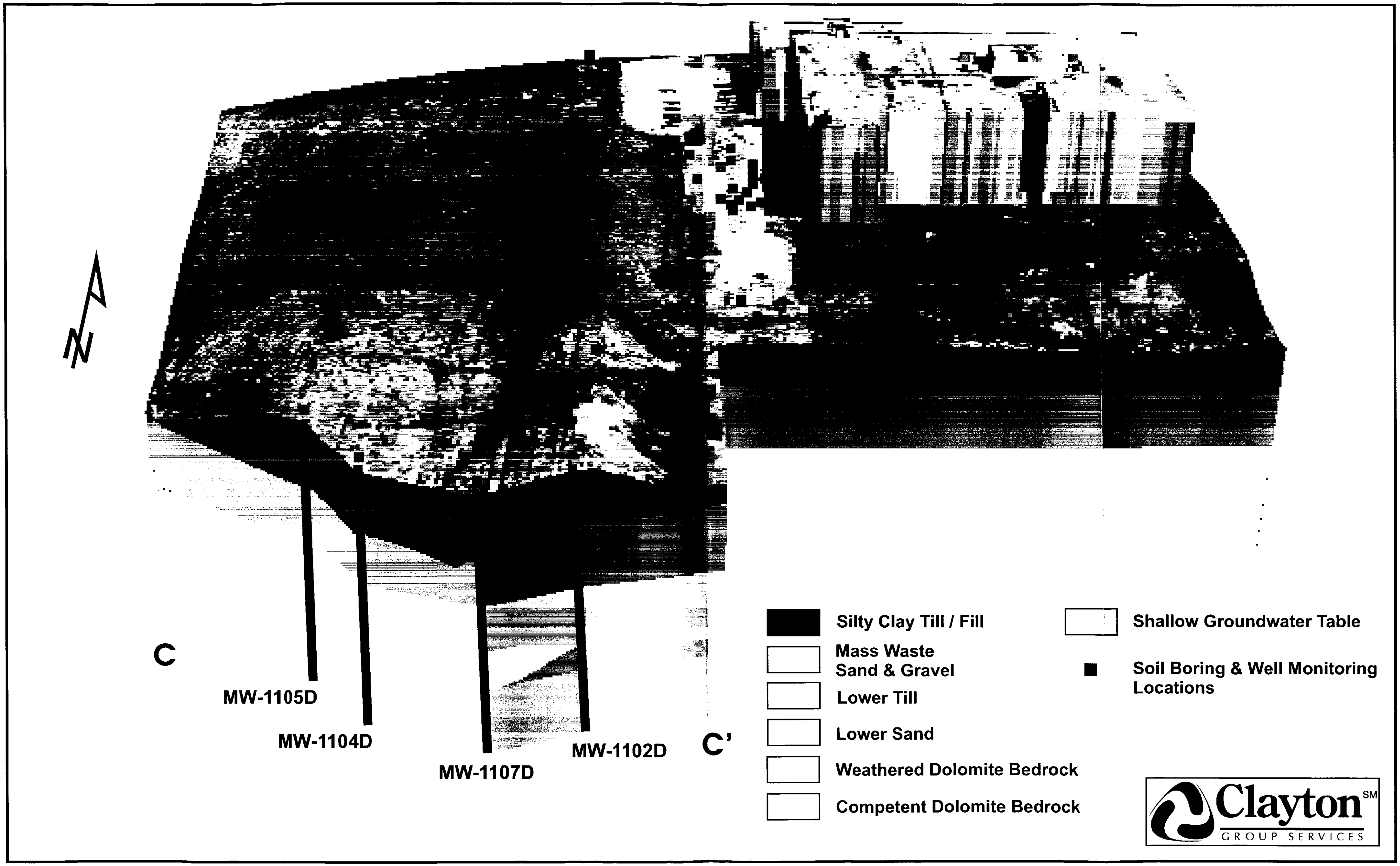
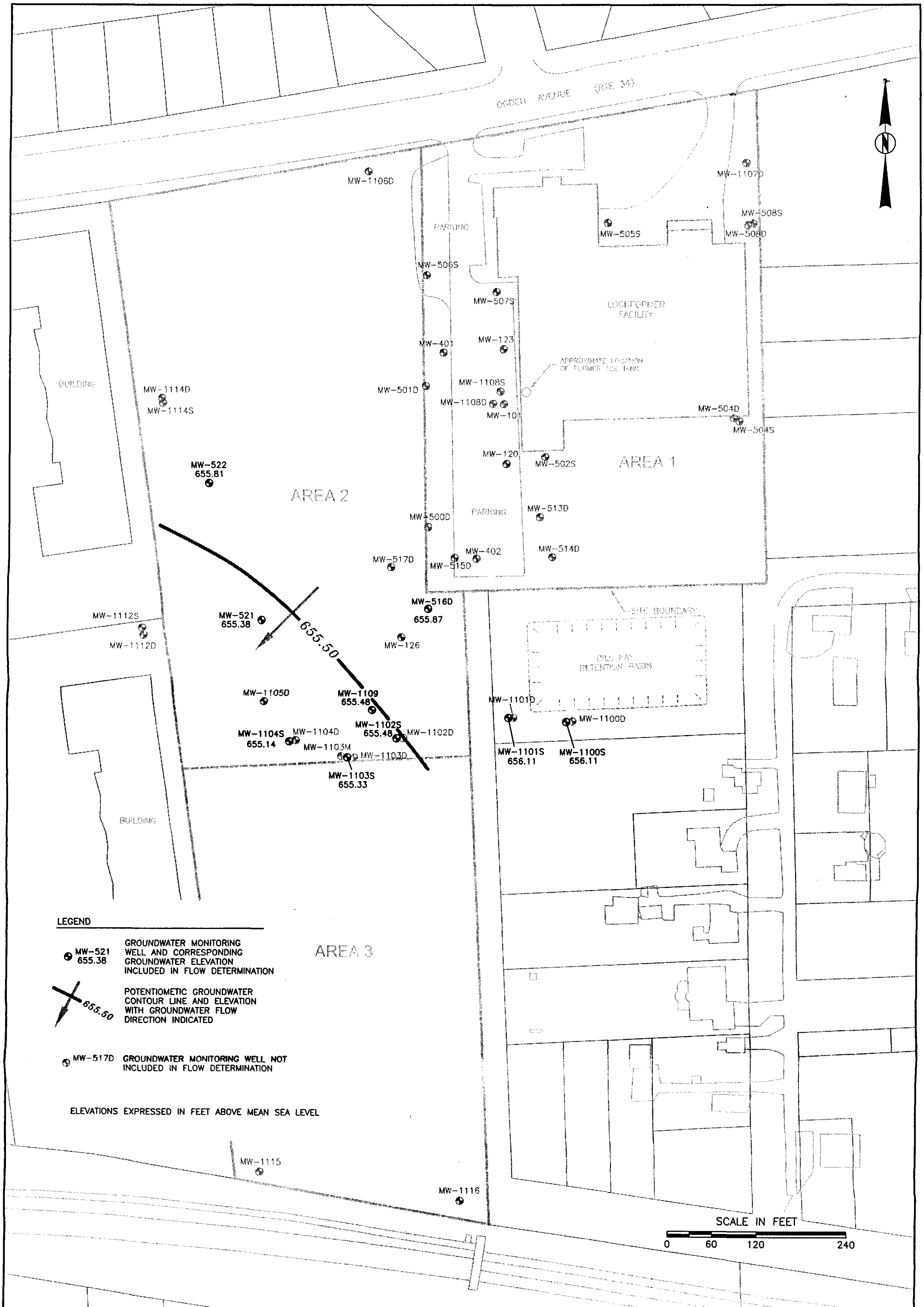


Figure 2.4.8 - 6 3-D Cross-Section - C-C'



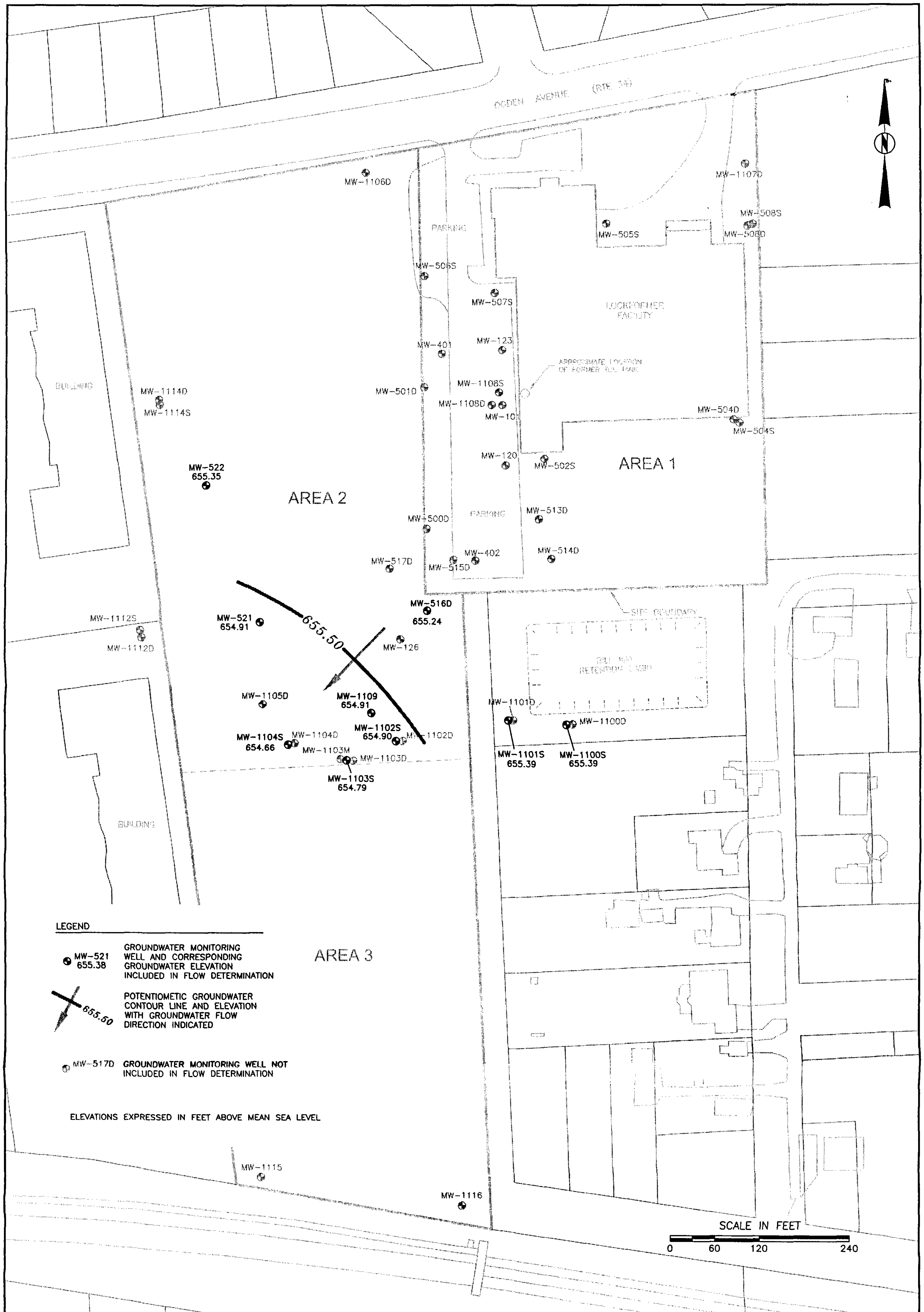
CHECK BY	
DRAWN BY BCP	
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08o
PRJ NO.	65263.01

GLACIAL DRIFT GROUNDWATER POTENTIOMETRIC SURFACE MAP
MAY 2001

THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 2.4.8-7



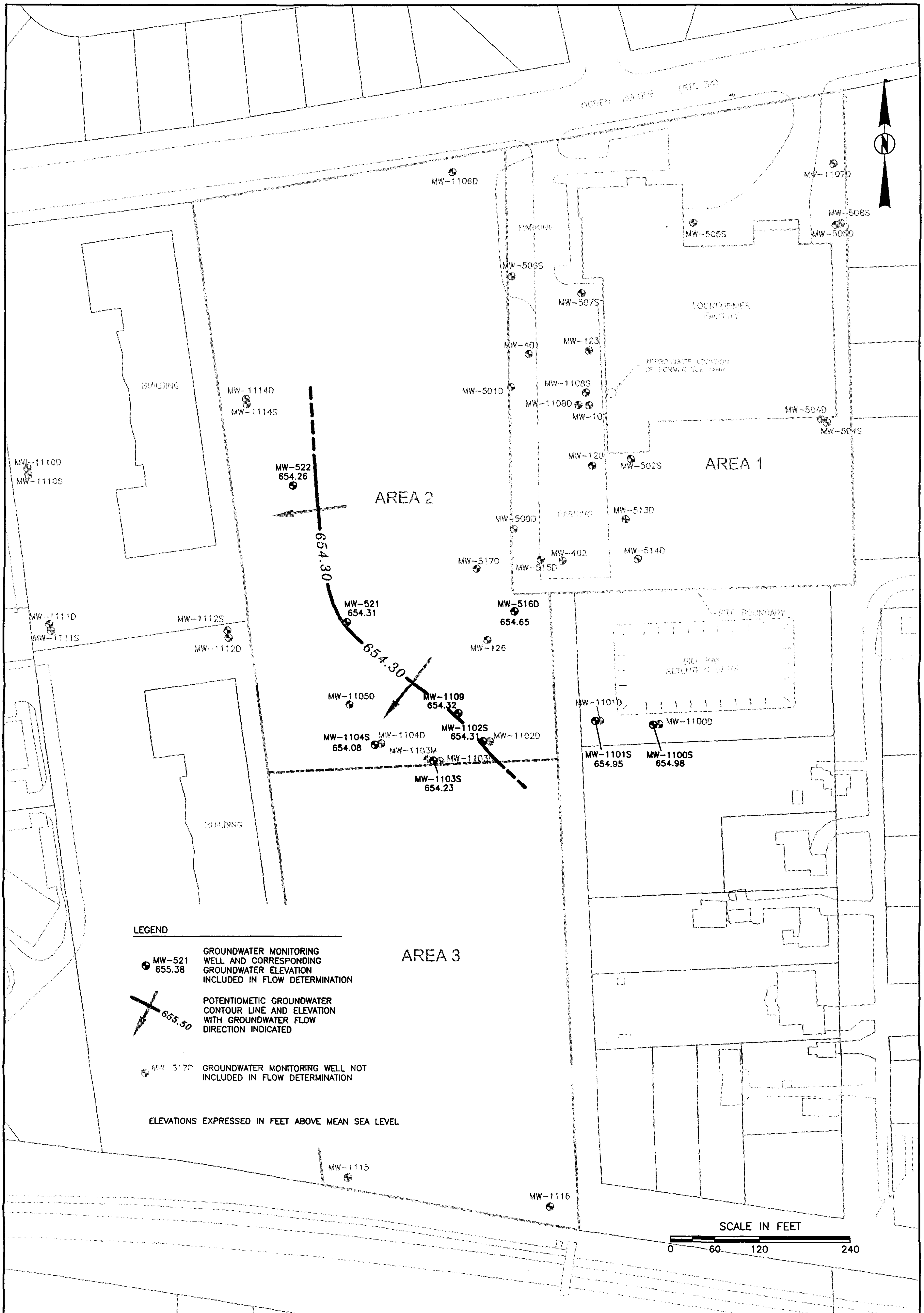
CHECK BY	
DRAWN BY	BCP
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08P
PRJ NO.	65263.01

GLACIAL DRIFT GROUNDWATER POTENTIOMETRIC SURFACE MAP
JUNE 2001

THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 2.4.8-8



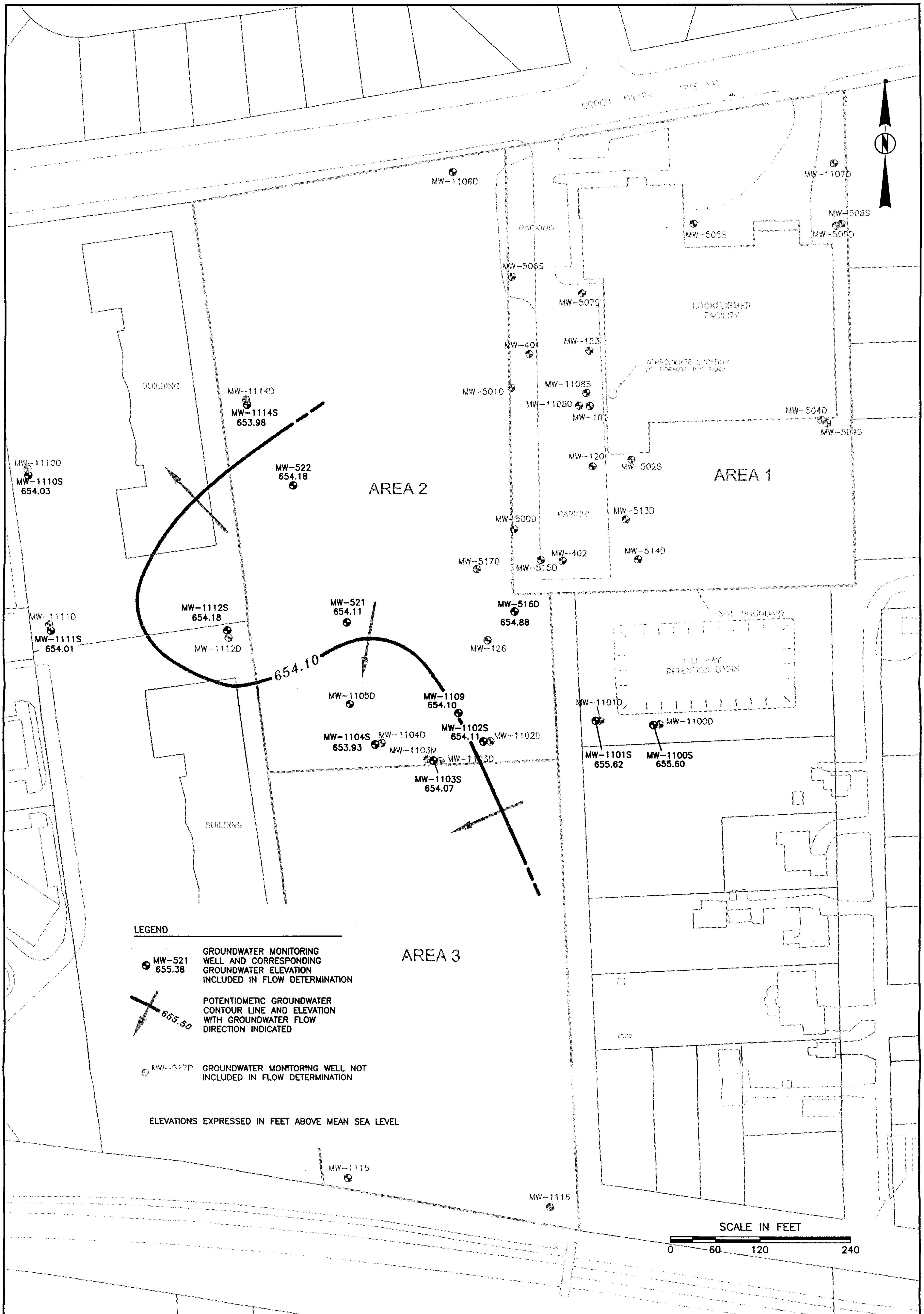
CHECK BY	
DRAWN BY	BCP
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08Q
PRJ NO.	65263.01

GLACIAL DRIFT GROUNDWATER POTENTIOMETRIC SURFACE MAP
AUGUST 2001

THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 2.4.8-9



CHECK BY	
DRAWN BY	BCP
DATE	5-10-02
SCALE	AS SHOWN
CAD NO.	65263-08R
PRJ NO.	65263.01

GLACIAL DRIFT GROUNDWATER POTENTIOMETRIC SURFACE MAP
SEPTEMBER 20, 2001

THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 2.4.8-10

E MAP FOR GLACIAL SEDIMENTS
MBER 2001

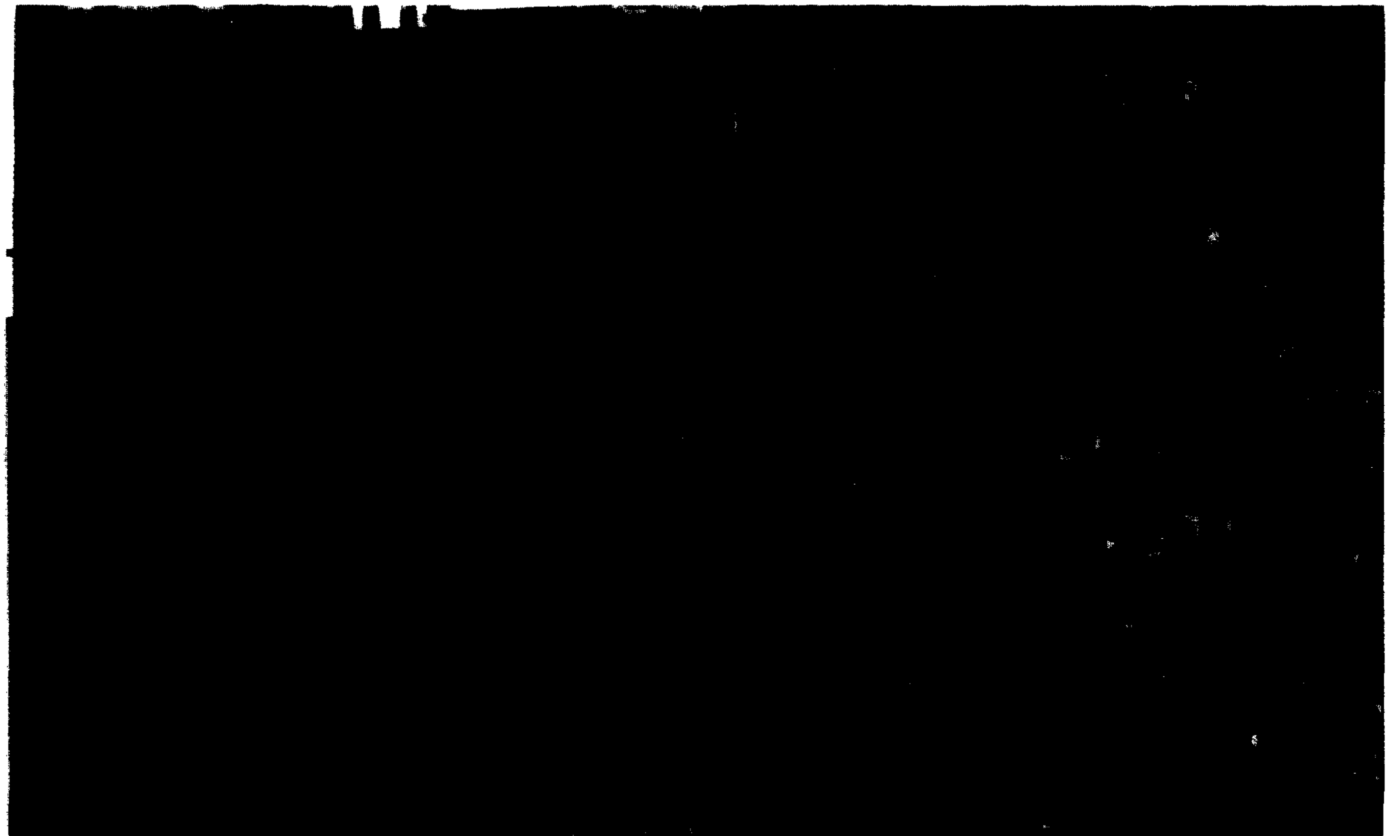
,160 1,740 2,320 Feet

Figure 24811.MXD
Date: 05/05/02
Drawn By: SFS

Clayton

Project: Lockformer 15-65263.01

Figure 2.4.8 - 11



MAP FOR GLACIAL SEDIMENTS
ᴀRY 2002

1,180 1,770 2,360
Feet

Figure 24812.MXD Date: 05/05/02 Drawn By: SFS	Clayton
Project: Lockformer 15-65263.01	
Figure 2.4.8 - 12	

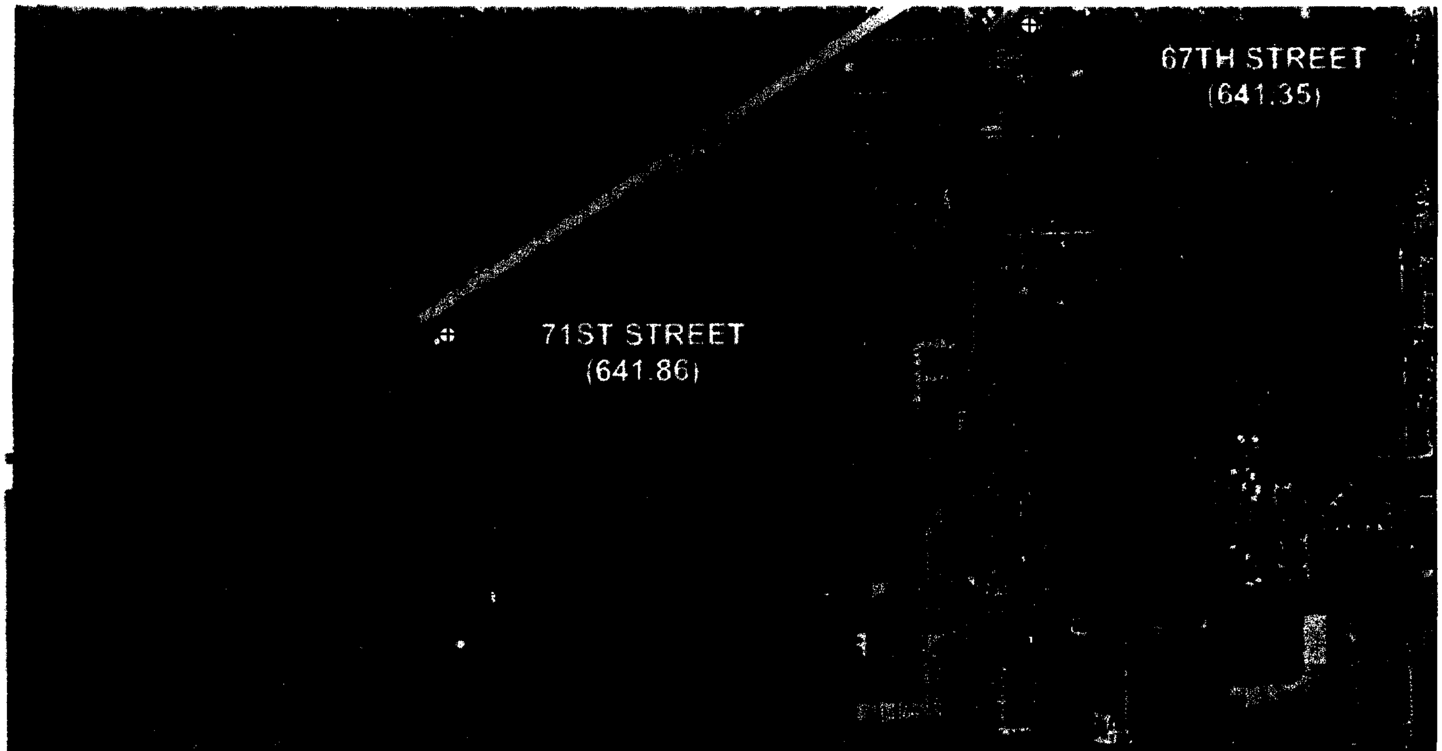
MAP FOR GLACIAL SEDIMENTS
H 2002

2,070 2,760 Feet

Figure 24813.MXD Date: 05/03/02 Drawn By; SFS	Clayton GROUP SERVICES

Project: Lockformer 15-65263.01

Figure 2.4.8 - 13



ĄCE FOR SILURIAN DOLOMITE
' 12, 2001

)00 7,500 10,000
Feet

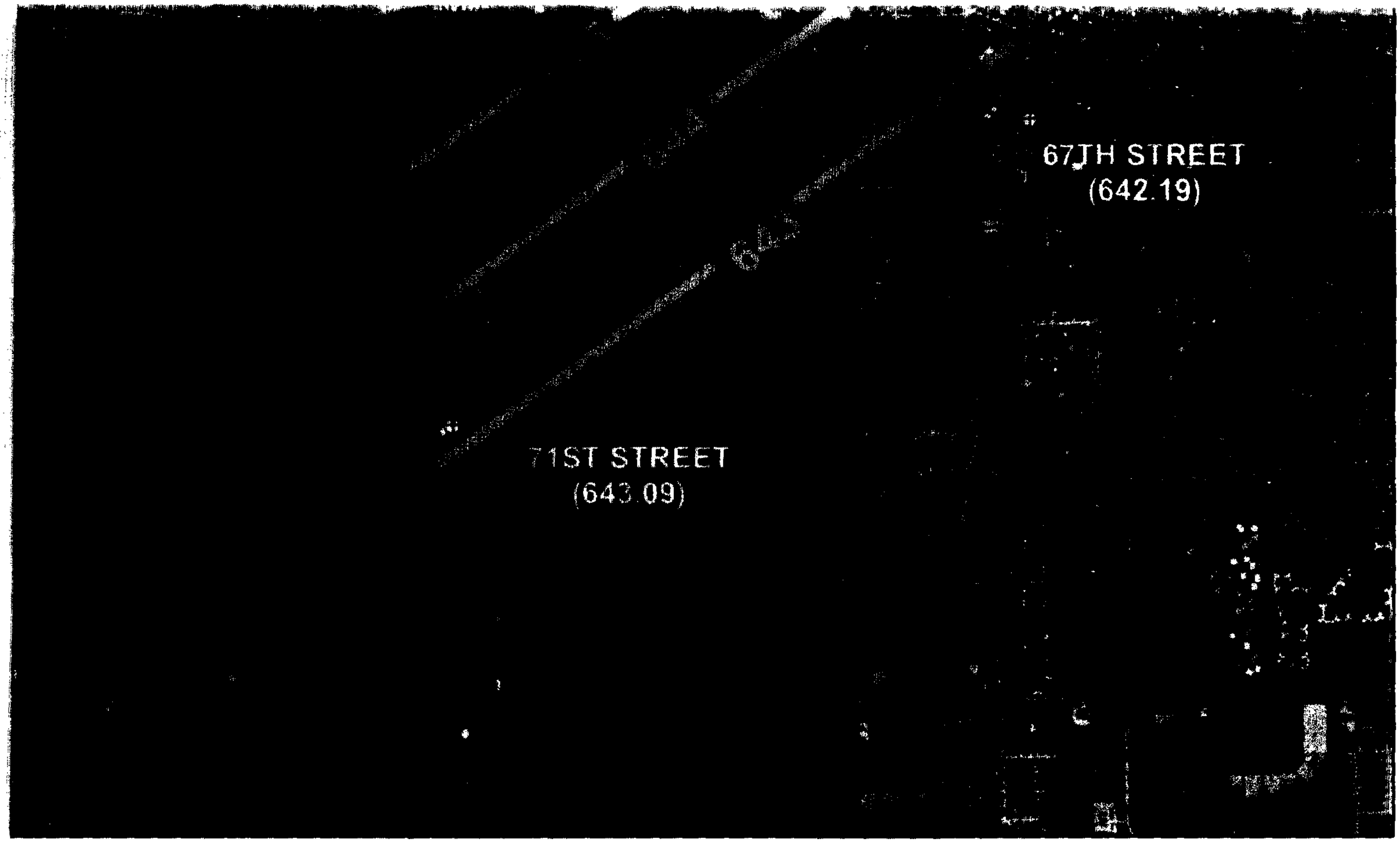
Figure 24814.MXD **Date: 05/05/02** **Drawn By: SFS**	Clayton℠ GROUP SERVICES
PROJECT: Lockformer 15-65263.01	

Figure 2.4.8 - 14

E FOR SILURIAN DOLOMITE
r 10, 2001

6,300 8,400
Feet

Figure 24815.MXD. Date: 05/05/02 Drawn By: SFS	Clayton GROUP SERVICES
PROJECT: Lockformer 15-65263.01 Figure 2.4.8 - 15	



E FOR SILURIAN DOLOMITE
:R 30, 2001

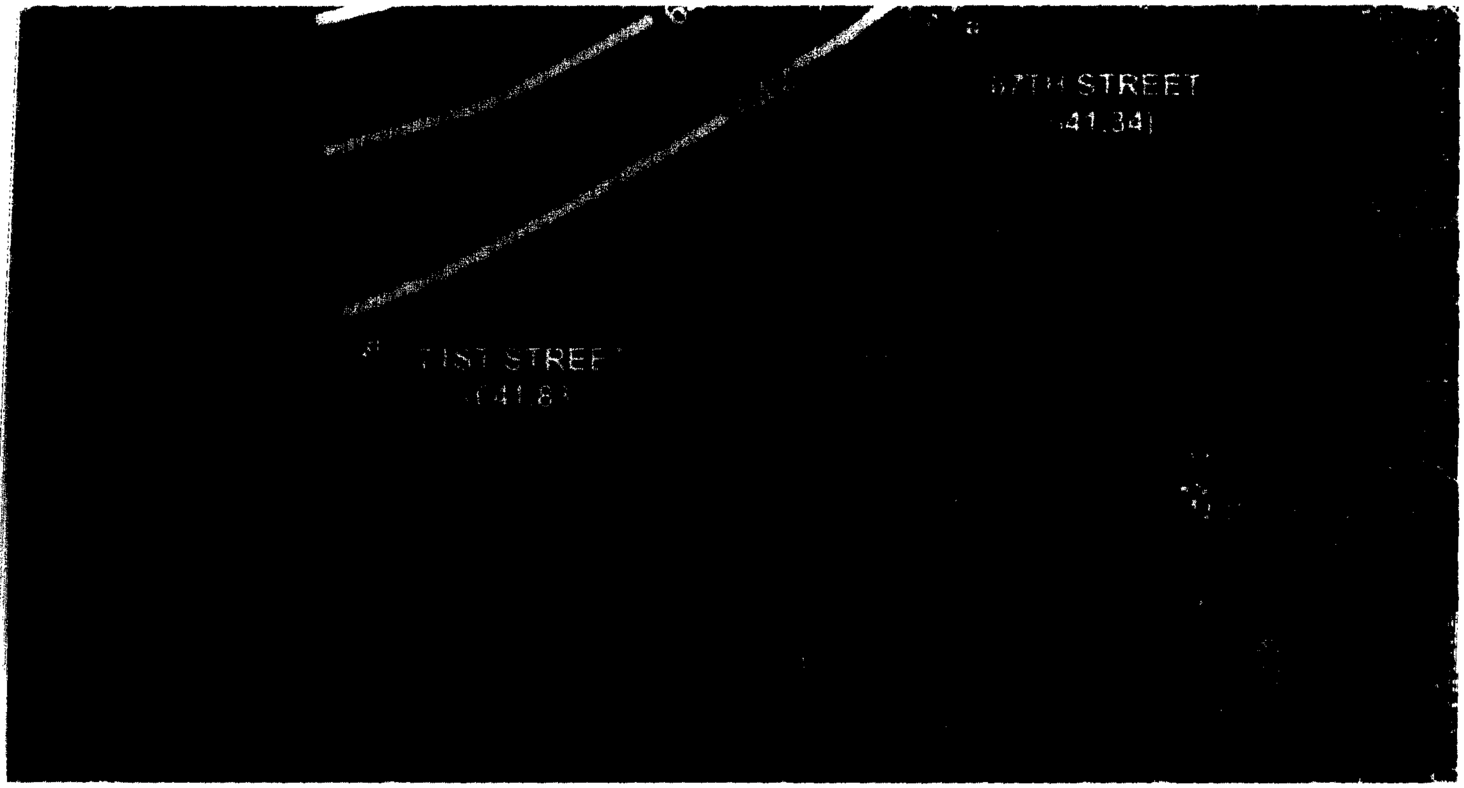
0 7,800 10,400
Feet

Figure 24816.MXD
Date: 05/05/02
Drawn By: SFS

Clayton[SM] GROUP SERVICES

PROJECT: Lockformer 15-65263.01

Figure 2.4.8 - 16



: FOR SILURIAN DOLOMITE

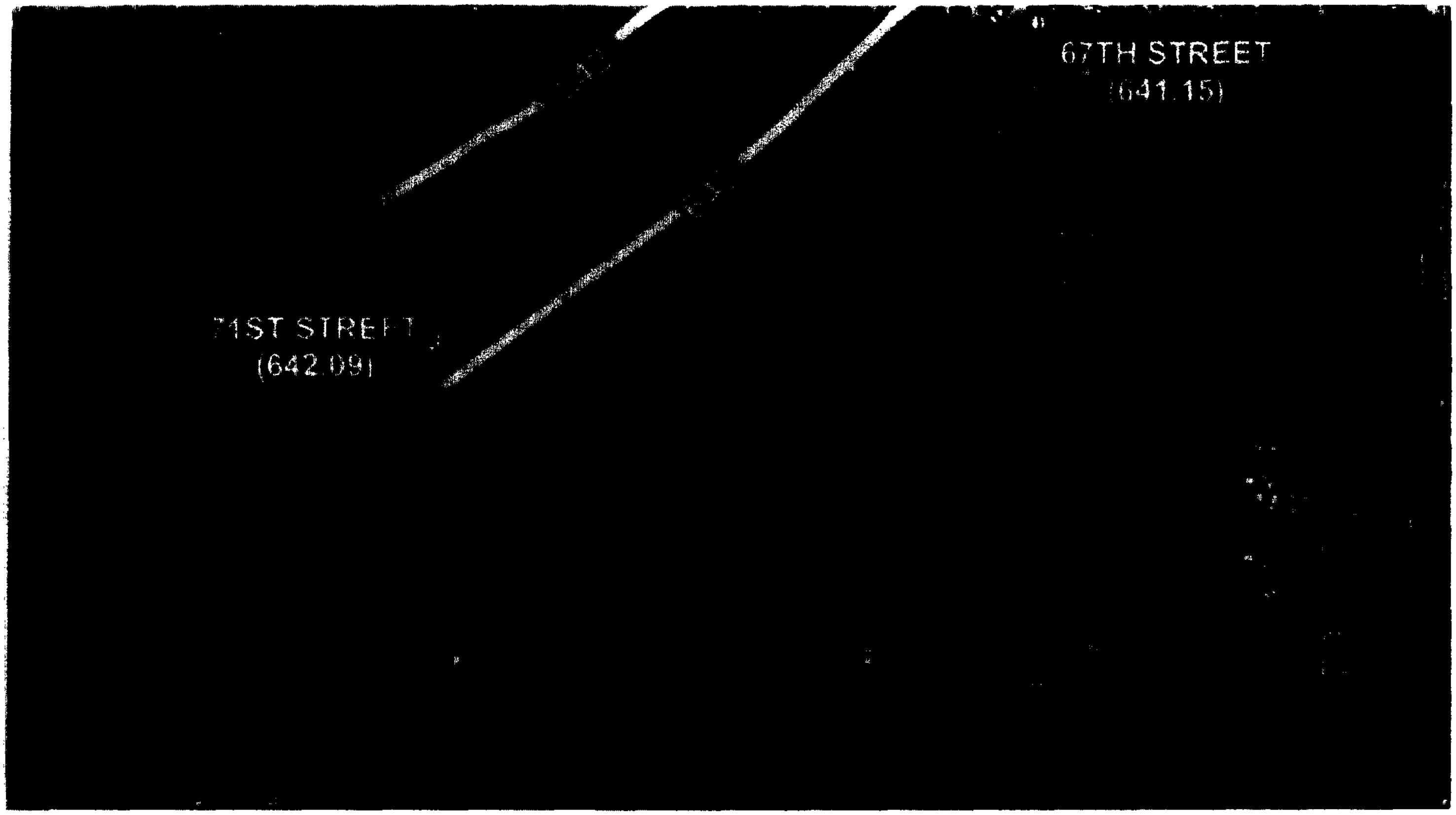
/ 14, 2002

7,200 9,600 Feet

Figure 24817.MXD **Date: 05/05/02** **Drawn By: SFS**	Clayton℠ GROUP SERVICES

PROJECT: Lockformer 15-65263.01

Figure 2.4.8 - 17



E FOR SILURIAN DOLOMITE
20, 2002

7,200 9,600 Feet

Figure 24818.MXD
Date: 05/05/02
Drawn By: SFS

Clayton Group Services

Project: Lockformer 15-65263.01

Figure 2.4.8 - 18

SECTION 2.0

TABLES

TABLE 2.4.4-1
Production Wells Providing Significant Withdrawal from the Silurian Dolomite Prior to the DuPage Water Commission Distributing Lake Michigan Water

The Lockformer Company / Lisle, Illinois

Owner / Identification (IEPA ID#)	Address / Location	Total Depth (ft)	Status	Casing Depth (ft)	Log Available	Est. Trans. (ft2/d)	Penetration (ft)	Units	K (ft/d)
The Lockformer Company	711 Ogden Avenue, Lisle		In use						
Illinois Toll Road #2	I-88 & Rt. 53, cloverleaf	35							
E. Donda	Warrenville Rd & Ivanhoe Ave	117							
Morton Arboretum Drug Plant	East of Morton Arboretum (off Finley Rd)	250							
St. Procopius College/ IL Benedictine College	North of Chicago & East of Yackley	245				6,818	155		44
Sacred Heart Monastery	South of Chicago & East of Yackley	237				535	142		4
Schiesher School	Kingston & Gamble	170				81,550	55	N	1483
Oakview Subdivision/ Citizens Utilities (20716)	5150 Kingston	200	Abandoned			8,556	85	N	101
Citizens Utilities	520 Meadow Lane	180	Abandoned						
Citizens Utilities (20717)	5700 Primrose	285	Standby						
Citizens Utilities (20718)	5790 Forest View		Standby						
Downers Grove Sanitation Dist.	Sewage Treatment Plant	150	Abandoned						
Rexnord (AKA Shaffer Bearing Co.)	2400 Curtiss Street	250	Fire	67		320,855	196	NA	1637
Maple Hill Improvement Association #2 (20473)	Pershing	158	Abandoned			4,679	64	N	73
Maple Hill Improvement Association #1(20472)	Glenview	117	Abandoned						
Belmont Highwood #1 (20518) (AKA - Arthur T. McIntosh)	Belmont Ave & Curtiss Street	148	Abandoned 1995						
Belmont Highwood #2 (20517) (AKA - Arthur T. McIntosh)	Elmore Street	295	Abandoned 1995		1	31,417	205	NAM	153
Village of DG #6 (20707)	5134 Lee Ave.	250	Abandoned 1993			66,845	183	NA	365
Village of DG #9 (20710)	4318 Downers Drive	300	Standby			5,348	210	NAM	25
Village of DG #10 (20711)	Katrine Avenue	150	Standby			25,668	75	N	342
Village of DG #11(20712)	1840 63rd Street	332	Standby						
Village of DG #12 (20713)	3301 Finley Road	330	Standby						
Village of DG #14 (20715)	1724 71st Street	385	Standby						
Illinois Municipal Water Co. (Old Lisle #1)	Burlington & Main Street, Lisle	231	Abandoned 1992				190	NA	

TABLE 2.4.4-1
Production Wells Providing Significant Withdrawal from the Silurian Dolomite Prior to the DuPage Water Commission Distributing Lake Michigan Water

The Lockformer Company / Lisle, Illinois

Owner / Identification (IEPA ID#)	Address / Location	Total Depth (ft)	Status	Casing Depth (ft)	Log Available	Est. Trans. (ft2/d)	Penetration (ft)	Units	K (ft/d)
Village of Lisle #2 (20729)	Walnut Avenue	330	Standby						
Illinois Municipal Water Co. (Old Lisle #2)	Winchester Avenue	233	Abandoned			51,337	148	NAM	347
Village of Lisle #3 (20730)	Rott Creek	193	Standby						
Village of Lisle #4 (20731)	Forbes Drive	350	Abandoned 1992						
Village of Lisle #5 (20732)	Greentrails	290	Standby						
Village of Lisle #6 (20733)	Centex	255	Standby						
Village of Lisle #7									
Lawn Meadow Subdivision	Taylor Drive	210				669	188		4

NOTES:

1 = Zeizel et. al., 1962
M = Maquoketa
A = Alexandrian
N = Niagaran

TABLE 2.4.4-2
Available Water Level Information
Production Wells in Lisle and Downers Grove
December 1985

The Lockformer Company / Lisle, Illinois

PRODUCTION WELLS	MEASUREMENT POINT ELEVATION	GROUND WATER ELEVATION
Oakview Subdivision / Citizens Utilities / Lisle #1	743	639
Primrose / Citizens Utilities / Lisle #2	748	642
Katrine / Downers Grove #10	709	647
Lee Avenue / Downers Grove #6	696	646
Downers Drive / Downers Grove #9	755	645
63rd Street / Downers Grove #11	740	642
Finley Road / Downers Grove #12	750	662
67th Street / Downers Grove #13	751	633

NOTES:

All water level measurements were made by air-line method.

Clayton Group Services determined the Measurement Point Elevation by Engineering Survey for the following wells:

Primrose / Citizens Utilities / Lisle #2 = 748.05 = 748
Katrine / Downers Grove #10 = 708.78 = 709
Downers Drive / Downers Grove #9 = 754.96 = 755
63rd Street / Downers Grove #11 = 739.55 = 740
Finley Road / Downers Grove #12 = 749.74 = 750
67th Street / Downers Grove #13 = 751.09 = 751

The Oakview Subdivision /Citizens Utilities/Lisle #1well had a ground surface elevation identified in Appendix D of the Cooperative Report (Zeizel et al. 1962) as 740 ft msl. The measurement point for equivalent air line measurement was conservatively assumed to be 743 feet msl.

The Lee Avenue / Downers Grove #6 measurement point was provided by the Village of Downers Grove.

TABLE 2.4.7-1
Lithologic Geotechnical Analysis in Area 1

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION		
	CSB-1203		
	43 ft	46 ft	53 ft
Non-Carbonate Organic Carbon (%)	0.1805	0.9225	0.669
Grain Size (USCS)	Sandy Gravel, Little Silt, **GP-GM**	Silty Clay, Trace Sand, Trace Gravel, **CL**	Silty Clay, Trace Sand, **CL**
Moisture Content (%)	NA	18.3	17.9
Specific Gravity	2.70	2.75	2.75
Bulk Density (pounds/ft^3) (dry)	NA	111.8	112.7

TABLE 2.4.7-1
Lithologic Geotechnical Analysis in Area 1

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1204							
	5 ft	25 ft	33 ft	46 ft	50 ft	54 ft	56 ft	70 ft
Non-Carbonate Organic Carbon (%)	0.7725	0.8055	0.376	0.283	0.872	0.8825	0.243	0.0979
Grain Size (USCS)	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Sand, Some Gravel, Little Silt, **SW-SM**	Sandy Gravel, Trace Silt, Trace Clay, **GW-GM**	Silty Clay, Trace Sand, Trace Gravel, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**
Moisture Content (%)	27.8	21.4	NA	NA	21.7	22.8	11.4	15.3
Specific Gravity	2.75	2.75	2.70	2.70	2.75	2.75	2.79	2.79
Bulk Density (pounds/ft^3) (dry)	95	106.1	NA	NA	106.0	103	129.1	119.2

TABLE 2.4.7-1
Lithologic Geotechnical Analysis in Area 1

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1205							
	5 ft	26 ft	32 ft	45 ft	49 ft	54 ft	60 ft	73 ft
Non-Carbonate Organic Carbon (%)	0.544	0.812	0.268	0.2635	0.5115	0.8635	0.1835	0.0772
Grain Size (USCS)	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Sand, Some Gravel, Little Silt, **SP-SM**	Gravelly Sand, Little Silt, **SW-SM**	Silty Clay, Some Sand, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Little Gravel, **CL**	Sand, Little Silt, **SP-SM**
Moisture Content (%)	22.0	22.6	NA	NA	14.3	20.8	8.6	NA
Specific Gravity	2.79	2.75	2.70	2.70	2.79	2.75	2.79	2.70
Bulk Density (pounds/ft^3) (dry)	102.6	103.6	121.7	NA	121.7	106.3	137.7	NA

TABLE 2.4.7-1
Lithologic Geotechnical Analysis in Area 1

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION								
	CSB-1206								
	3 ft	33 ft	36 ft	47 ft	49 ft	53 ft	56 ft	59 ft	75 ft
Non-Carbonate Organic Carbon (%)	0.5505	0.8435	0.2545	0.212	0.6325	0.825	0.688	0.172	0.0854
Grain Size (USCS)	Silty Clay, Little Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Gravelly Sand, Little Silt, **SW-SM**	Sand, Trace Gravel, Some Silt, **SM**	Silty Clay, Trace Sand, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Clayey Sand, Trace Gravel, **SC**
Moisture Content (%)	20.0	22.5	NA	NA	18.1	19.1	22.9	10.5	16.1
Specific Gravity	2.75	2.75	2.70	2.70	2.75	2.75	2.75	2.79	2.78
Bulk Density (pounds/ft^3) (dry)	108.1	103.9	NA	NA	112.5	110.5	103.6	131.9	109.1

TABLE 2.4.7-1
Lithologic Geotechnical Analysis in Area 1

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1207							
	3 ft	33 ft	36 ft	47 ft	51 ft	64 ft	67 ft	75 ft
Non-Carbonate Organic Carbon (%)	0.472	0.827	0.143	0.27	0.84	0.22	0.06	0.10
Grain Size (USCS)	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Gravel, Some Sand, Little Silt, **GW-GM**	Sand, Little Gravel, Some Silt, **SM**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Sand, Trace Clay, **SM**	Clayey Sand, **SM**
Moisture Content (%)	18.3	17.3	NA	NA	19.0	15.0	15.3	17.1
Specific Gravity	2.79	2.79	2.70	2.70	2.75	2.79	2.78	2.78
Bulk Density (pounds/ft^3) (dry)	112.7	114.9	NA	NA	110	119.9	116.4	110.3

TABLE 2.4.7-1
Lithologic Geotechnical Analysis in Area 1

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1208							
	5 ft	**28 ft**	**32 ft**	**44 ft**	**47 ft**	**52 ft**	**57 ft**	**71 ft**
Non-Carbonate Organic Carbon (%)	0.89	0.82	0.35	0.27	0.57	0.89	0.17	0.21
Grain Size (USCS)	Silty Clay, Little Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Sandy Gravel, Little Silt, **GW-GM**	Sand, Some Gravel, Trace Silt, **SP**	Silty Clay, Some Sand, Some Gravel, **CL**	Silty Clay, Trace Sand, **CL**	Clayey Sand, Some Gravel, **SC**	Silty Clay, Little Sand, Trace Gravel, **CL**
Moisture Content (%)	24.5	18.9	NA	NA	17.9	22.4	10.9	13.4
Specific Gravity	2.75	2.75	2.70	2.70	2.78	2.75	2.78	2.79
Bulk Density (pounds/ft^3) (dry)	99.7	110.3	NA	NA	111.1	103.8	130.6	123.8

TABLE 2.4.7-1
Lithologic Geotechnical Analysis in Area 1

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1209							
	3 ft	**29 ft**	**33 ft**	**44 ft**	**46 ft**	**52 ft**	**57 ft**	**70 ft**
Non-Carbonate Organic Carbon (%)	0.28	0.81	0.32	0.32	0.86	0.84	0.23	0.08
Grain Size (USCS)	Silty Clay, Little Sand, Little Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Sand, Some Gravel, Little Silt, **SP-SM**	Gravelly Sand, Little Silt, **SW-SM**	Silty Clay, Trace Sand, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Little Gravel, **CL**	Silt and Sand, **ML**
Moisture Content (%)	19.7	21.8	NA	NA	21.0	21.9	13.9	17.5
Specific Gravity	2.79	2.75	2.70	2.70	2.75	2.75	2.79	2.79
Bulk Density (pounds/ft^3) (dry)	106.7	105.4	NA	NA	106.6	104.8	122.6	108.9

TABLE 2.4.7-1
Lithologic Geotechnical Analysis in Area 1

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1210							
	3 ft	28 ft	31 ft	45 ft	46 ft	54 ft	57 ft	69 ft
Non-Carbonate Organic Carbon (%)	0.48	0.83	0.24	0.31	0.85	0.91	0.45	0.09
Grain Size (USCS)	Silty Clay, Little Sand, Trace Gravel, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Sand, Some Gravel, Some Silt, **SM**	Sand, Some Gravel, Little Silt, **SP-SM**	Silty Clay, Trace Sand, Trace Gravel, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Little Gravel, **CL**	Sand, Some Silt, **SC**
Moisture Content (%)	18.3	16.5	NA	NA	20.7	20.5	12.0	NA
Specific Gravity	2.79	2.79	2.70	2.70	2.75	2.75	2.79	2.70
Bulk Density (pounds/ft^3) (dry)	112.3	117.1	NA	NA	107	107.4	127.7	NA

TABLE 2.4.7-1
Lithologic Geotechnical Analysis in Area 1

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	MW-1108S							
	4 ft	32 ft	35 ft	45 ft	49 ft	55 ft	75 ft	60 ft
Non-Carbonate Organic Carbon (%)	0.57	0.82	0.10	0.33	0.74	0.93	0.13	0.23
Grain Size (USCS)	Silty Clay, Little Sand, Trace Gravel, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Sand, Little Gravel, Some Silt, **SM**	Sandy Gravel, Little Silt, **GP-GM**	Silty Clay, Trace Sand, **CL**	Silty Clay, Trace Sand, **CL**	Sand, Trace Silt, **SP**	Silty Clay, Some Sand, Some Gravel, **CL**
Moisture Content (%)	22.7	17.0	NA	NA	19.3	18.9	NA	12.5
Specific Gravity	2.75	2.79	2.70	2.70	2.75	2.75	2.70	2.78
Bulk Density (pounds/ft^3) (dry)	103.4	115.2	NA	NA	110	109.5	NA	126.4

TABLE 2.4.7-2
Summary of Average Geotechnical Results by Lithologic Unit

The Lockformer Company / Lisle, Illinois

LITHOLOGIC UNIT	FRACTION OF ORGANIC CARBON (foc)	MOISTURE CONTENT (Ow)	BULK DENSITY (Pb)
Fill / Till (1)	0.694	20.71	107.31
Mass Waste (2)	0.2635	ND	ND
Lower Till (3)	0.74	19.06	110.55
Lower Sand (4)	0.192	14.22	120.84

NOTES:

ND = Not Determined

TABLE 2.4.8-1
Lockformer Site Water Level Measurements

Monitoring Well ID	Top of Casing Elevation (msl)	**Top of Casing Elevation (Updated)	GW Elev. Aug-98 (msl)	GW Elev. Feb-99 (msl)	GW Elev. Mar-99 (msl)	GW Elev. Dec-99 (msl)	GW Elev. Nov-00 (msl)	GW Elev. 12/19/01 (msl)	GW Elev. 1/11/01 (msl)	GW Elev. 3/21/01 (msl)	GW Elev. 5/15/01 (msl)
BW-1	742.67	742.67						652.21	656.76	653.70	653.80
BW-2	689.16							652.76	652.51	654.06	654.25
BW-3	698.58							652.90	652.66	654.22	654.40
P-1	742.87							709.58	709.77	709.93	
P-2	689.25							668.37	668.16	668.05	
P-3	698.68							652.75	652.53	654.06	
MW-101	710.84		699.40	702.44	701.63		698.64	697.93	699.49	700.87	699.37
MW-104	710.12										
MW-105	710.90										
MW-120	707.84		675.04	675.19	674.86	674.74	668.50	668.30	668.18	669.32	668.43
MW-123	712.62		700.27	702.47	702.48	699.81	700.27	699.90	700.30	701.57	701.10
MW-126	706.30		655.80	655.00	654.91	652.92	653.60	653.73	655.26	655.18	654.72
MW-401	707.68	707.67	657.43	656.73	656.80	655.96	655.73	655.61	655.46	655.83	656.42
MW-402	700.71	700.74	655.56	657.71	655.81	654.20	654.86	654.17	653.79	655.20	655.94
MW-403	* 709.10		656.15	655.95	655.74	653.47					
MW-500S	703.29										
MW-500D	703.66			656.26	655.72	655.80	654.49	655.36	654.54	659.85	655.76
MW-501S	706.96					695.53	695.98	689.49	692.83		
MW-501D	707.34			656.84	656.79	655.23	655.42	655.19	655.01	656.03	656.47
MW-502S	712.38		699.40	701.28	701.93	703.73	707.06	707.25	706.66	706.86	707.89
MW-503S	* 712.07					693.39					
MW-504S	710.35										
MW-504D	711.51			656.11	657.39	653.87	654.81	655.42	658.64	656.48	655.93
MW-505S	707.00										
MW-506S	* 710.90										
MW-507S	711.59										
MW-508S	707.43										
MW-508D	707.50			658.30	656.54	653.90	655.00	654.79	654.48	655.47	655.88
MW-513D	706.90			656.15	655.76	653.49	654.67	654.01	655.52	655.54	655.73
MW-514D	701.19			657.29	655.78	653.71	654.95	654.14	653.76	655.80	655.93
MW-515D	703.07			656.57	655.94	653.52	654.81	654.53	657.00	659.62	655.87
MW-516D	700.59			656.59	655.94	653.61	654.75	654.07	658.68	658.67	655.87
MW-517D	709.66			656.36	655.77	653.67	654.51	653.97	656.53	659.85	655.75
MW-518D	* 690.65					653.46					
MW-519D	* 693.83					653.81					
MW-520	701.71						654.05	653.67	653.43	655.22	
MW-521	709.11						656.15	653.79	656.00	655.86	655.38
MW-522	706.29						654.26	653.76	653.51	655.51	655.81
MW-1100S	690.42										656.11
MW-1100D	690.90	690.91									654.74
MW-1101S	690.82										656.11
MW-1101D	691.27	691.26									654.73
MW-1102S	700.52										655.48
MW-1102D	700.57	700.56									654.68
MW-1103S	696.85										655.33
MW-1103M	696.82										654.72
MW-1103D	697.27	697.25									654.68
MW-1104S	698.84										655.14
MW-1104D	698.85	698.83									654.84
MW-1105D	702.89	702.88									654.87
MW-1106D	718.88	718.87									655.06
MW-1107D	710.03	710.05									654.87
MW-1108S	708.25										654.75
MW-1108D		707.32									
MW-1109	701.04	701.05									655.48
MW-1110S		681.90									
MW-1110D		681.94									
MW-1111S		680.22									
MW-1111D		680.17									
MW-1112S		681.32									
MW-1112D		680.75									
MW-1113S		692.11									
MW-1113M		692.40									
MW-1113D		692.11									
MW-1114S		698.87									
MW-1114D		699.10									
MW-1115		684.23									
MW-1116		682.50									
MW-1600S		729.08									
MW-1600D		729.09									
MW-1601S		703.97									
MW-1601D		703.82									
MW-1602S		686.61									
MW-1602D		687.05									
MW-1603		698.74									
MW-1604		690.29									
MW-1605		689.32									
SG-1	681.80									671.33	670.59
SG-2	676.50									666.99	666.44
SG-3	677.70									664.12	663.34
SG-4		680.6									
SG-5		671									
SG-6		668.88									
Katrine Well		708.78									
Finley Well		749.74									
Downer Dr. Well		754.96									
67th St. Well		751.09									
71st St. Well		784.76									
63rd St. Well		739.55									

NOTES: msl = mean sea level
GW = Ground Water
Shaded cells = Not Applicable
Depth to groundwater measured from the top of the well casing.
* Top of casing elevations calculated using average difference observed between Carlson's relative elevation measurements and the January 5, 2001 survey.
** Updated top of casing elevations should be used to determine groundwater elevations after 5/15/2001.

TABLE 2.4.8-1
Lockformer Site Water Level Measurements

Monitoring Well ID	Top of Casing Elevation (msl)	**Top of Casing Elevation (Updated)	GW Elev. 6/27/01 (msl)	GW Elev. 7/12/01 (msl)	GW Elev. 8/10/01 (msl)	GW Elev. 9/10/01 (msl)	GW Elev. 9/20/01 (msl)	GW Elev. 10/17/01 (msl)	GW Elev. 11/30/01 (msl)	GW Elev. 2/14/02 (msl)	GW Elev. 3/20/02 (msl)
BW-1	742.67	742.67	653.27	652.76	652.66	652.73	652.64	654.20	653.78	652.65	653.58
BW-2	689.16		653.64	653.25	653.10	653.14	653.15	654.81	654.18	653.06	653.98
BW-3	698.58		653.74	653.37	653.22	653.29	653.31	654.95	654.31	653.20	654.12
P-1	742.87										
P-2	689.25										
P-3	698.68										
MW-101	710.84		698.57		698.51		698.67	699.78	698.76	698.49	700.23
MW-104	710.12										
MW-105	710.90										
MW-120	707.84		660.08		666.12		666.05	666.83	666.89	672.11	670.03
MW-123	712.62		700.19		700.17		700.56	701.55	700.47	700.20	701.32
MW-126	706.30		654.08		653.53		653.50	655.16	654.60	653.47	654.37
MW-401	707.68	707.67	656.56		656.31		655.99	656.02	656.45	655.99	655.95
MW-402	700.71	700.74	655.31		654.79		654.93	657.29	655.83	654.60	655.37
MW-403	* 709.10										
MW-500S	703.29										
MW-500D	703.66		655.23		654.63		654.39	656.08	655.57	654.36	655.08
MW-501S	706.96										
MW-501D	707.34		656.41		655.96		655.58	656.06	656.23	655.51	655.86
MW-502S	712.38		704.09		705.79		707.22	706.80	709.36	706.44	705.61
MW-503S	* 712.07										
MW-504S	710.35										
MW-504D	711.51		655.45		654.88		654.69	655.62	655.72	654.57	655.13
MW-505S	707.00										
MW-506S	* 710.90										
MW-507S	711.59										
MW-508S	707.43										
MW-508D	707.50		655.62		655.04		654.74	655.13	655.63	654.55	654.97
MW-513D	706.90		655.11		654.55		654.71	656.29	655.53	654.39	655.09
MW-514D	701.19		655.27		654.79		655.18	656.91			
MW-515D	703.07		655.24		654.70		654.78	657.05	655.69	654.52	655.27
MW-516D	700.59		655.24		654.65		654.88	657.36	655.72	654.50	655.36
MW-517D	709.66		655.18		654.62		654.41	656.36	655.64	654.38	655.14
MW-518D	* 690.65										
MW-519D	* 693.83										
MW-520	701.71										
MW-521	709.11		654.91		654.31		654.11	655.11	655.30	654.11	654.93
MW-522	706.29		655.35		654.26		654.18	655.12	655.70	654.14	655.13
MW-1100S	690.42		655.39		654.98		655.60	658.09	655.92	654.76	655.63
MW-1100D	690.90	690.91	654.08	653.66	653.54	653.56	653.54	655.15	654.57	653.47	654.40
MW-1101S	690.82		655.39		654.95		655.62	657.72	655.91	654.80	655.64
MW-1101D	691.27	691.26	654.06	653.64	653.52	653.54	653.54	655.12	654.55	653.46	654.38
MW-1102S	700.52		654.90		654.31		654.11	656.37	655.27	654.36	655.22
MW-1102D	700.57	700.56	654.05	653.65	653.55	653.58	653.54	655.27	654.55	653.49	654.37
MW-1103S	696.85		654.79		654.23		654.07	656.07	654.62	654.30	655.11
MW-1103M	696.82		654.11		653.57		653.62	654.84	655.09	653.51	654.41
MW-1103D	697.27	697.25	654.04	653.64	653.54	653.55	653.61	655.65	654.56	653.48	654.35
MW-1104S	698.84		654.66		654.08		653.93	655.42	654.98	653.99	654.84
MW-1104D	698.85	698.83	654.20	653.79	653.67	653.72	653.73	655.42	654.69	653.60	654.52
MW-1105D	702.89	702.88	654.26	653.85	653.73	653.77	653.79	655.48	654.73	653.64	654.57
MW-1106D	718.88	718.87	654.46	654.03	653.91	653.96	653.96	655.70	664.88	653.80	654.76
MW-1107D	710.03	710.05	654.32	653.90	653.78	653.81	653.78	655.48	654.83	653.68	654.54
MW-1108S	708.25		654.16		653.58	653.60	653.58	655.24	654.66	653.51	654.41
MW-1108D		707.32						655.63	654.88	653.76	654.62
MW-1109	701.04	701.05	654.91		654.32		654.10	656.29	655.24	654.35	655.20
MW-1110S		681.90					654.03	655.82	654.97	653.86	654.82
MW-1110D		681.94				653.97	652.20	655.83	654.95	653.83	654.83
MW-1111S		680.22					654.01	655.90	654.89	653.81	654.80
MW-1111D		680.17				653.94	653.98	655.75	654.93	653.78	654.76
MW-1112S		681.32					654.18	655.33	655.28	654.17	655.00
MW-1112D		680.75				653.86	653.90	655.64	654.91	653.74	654.69
MW-1113S		692.11					653.52	655.30	654.58	653.54	654.54
MW-1113M		692.40					653.45	655.07	654.51	653.44	655.32
MW-1113D		692.11					653.46	655.08	654.51	653.44	654.54
MW-1114S		698.87					653.98	655.76	654.89	653.85	654.76
MW-1114D		699.10					653.98	655.74	654.91	653.82	654.76
MW-1115		684.23							654.34	653.24	654.17
MW-1116		682.50							654.34	652.55	654.20
MW-1600S		729.08							652.04	650.76	651.58
MW-1600D		729.09							651.91	650.63	651.66
MW-1601S		703.97							653.16	651.65	
MW-1601D		703.82							652.69	651.29	
MW-1602S		686.61							654.00	652.77	653.60
MW-1602D		687.05							653.68	652.42	653.33
MW-1603		698.74							654.24	653.23	654.20
MW-1604		690.29							654.15	652.99	653.92
MW-1605		689.32							654.07	652.92	653.80
SG-1	681.80		670.41		670.51	670.66	670.94	670.98	670.85	670.71	670.60
SG-2	676.50		666.32	666.27	666.41	666.51	666.72	666.93	666.83	666.65	666.57
SG-3	677.70		663.20	663.04	663.37	663.48	663.73	663.71	663.64	663.46	663.42
SG-4		680.6		664.34	664.53	664.74	666.46	665.61	665.20	664.64	664.61
SG-5		671		656.80	656.96	657.14	658.72	658.09	657.42	657.02	657.02
SG-6		668.88		651.93	652.40	652.71	654.98	654.26	653.16	652.68	652.47
Katrine Well		708.78		648.49		650.12			649.81	648.19	649.14
Finley Well		749.74		669.08		667.20			670.35	669.78	671.10
Downer Dr. Well		754.96		652.42		651.94			653.41	652.43	652.56
67th St. Well		751.09		641.35		640.86			642.19	641.34	641.15
71st St. Well		784.76		641.86		641.54			643.09	641.83	642.09
63rd St. Well		739.55				646.77			647.12	645.99	646.01

NOTES: msl = mean sea level
GW = Ground Water
Shaded cells = Not Applicable
Depth to groundwater measured from the top of the well casing.
* Top of casing elevations calculated using average difference observed between Carlson's relative elevation measurements and the January 5, 2001 survey.
** Updated top of casing elevations should be used to determine groundwater elevations after 5/15/2001.

TABLE 2.4.8-3
Vertical Hydraulic Gradients Along Front Street

The Lockformer Company / Lisle, Illinois

WELLS						
	Dec-00		***Jan-01***		***Mar-01***	
P-3	⇧	652.75	⇧	652.53	⇧	654.06
BW-3		652.90		652.66		654.22
	Nov-01		***Feb-02***		***Mar-02***	
1603	⇧	654.24	⇩	653.23	⇩	654.20
BW-3		654.31		653.20		654.12
	Nov-01		***Feb-02***		***Mar-02***	
1605	⇧	654.07	⇧	652.92	⇧	653.80
BW-2		654.18		653.06		653.98